

CIO

The Magazine for Information Executives

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CAN MAKE IT WORK

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◀ Meet Roger Mowen,
Eastman Chemicals' CIO

Double Duty

CIO as Venture Capitalist

Meet Roger Mowen, ▶
Eastman Chemicals' top
INVESTMENT MANAGER

How to Manage TECHNOLOGY By Managing Technology INVESTMENTS

PLUS: An Inside Look at Eastman Chemicals'
Technology Portfolio PAGE 86

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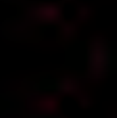
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What would have
happened if
Napoleon had
our technology?

NAPOLEON IMPLEMENTS
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Napoleon was exceptionally intelligent and prompt to make decisions. In other words, the quintessential CEO. But, ultimately, his hopes of accelerating growth and managing a global empire came to an abrupt end.



However, let's imagine for the sake of argument that Napoleon had been able to leverage Novient's technology.

(He would probably have preferred a dozen Stealth bombers, but we'll let the Pentagon run that ad.)

NOVIENT OPTIMIZES PERFORMANCE
OF FRENCH WORKERS

Alright, so the revolution is over and Napoleon must get France in order.

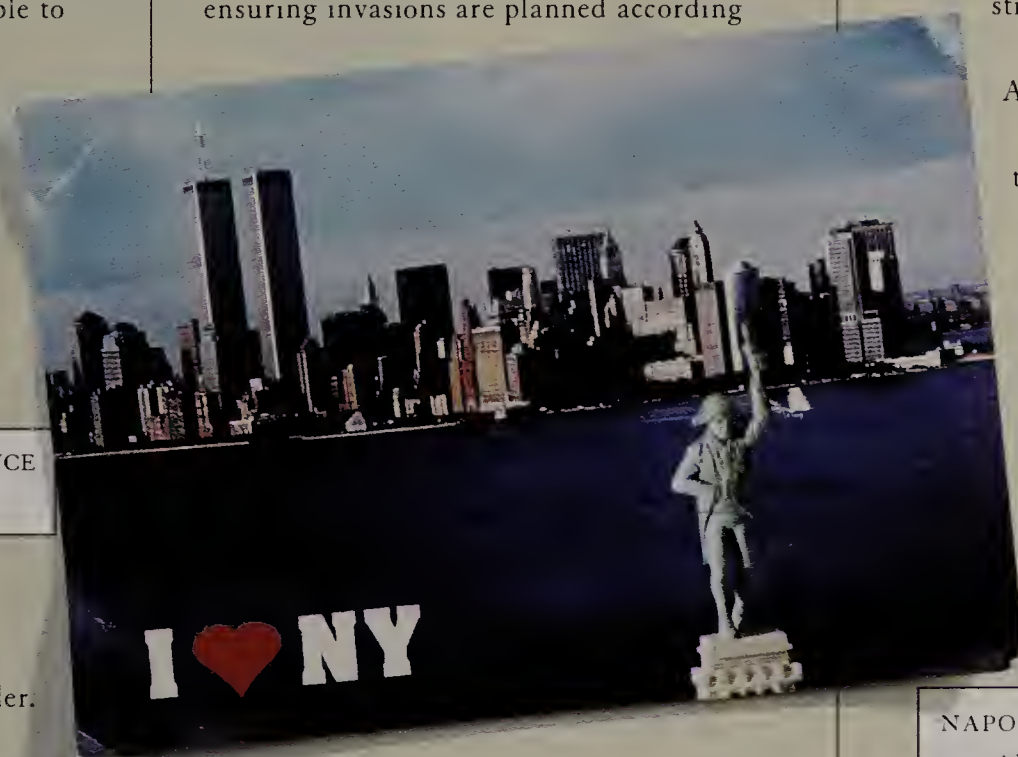
No problem. Novient's technology enables him to optimize the allocation of government activities with his most qualified workers. Moreover, he's able to locate and recruit the best talent available. Having dramatically increased the efficiency of his government, Napoleon takes off with his armies to expand his empire.



He's able to prioritize which countries to attack and when, based on availability of troops and supplies. In fact, he's able to determine which battles will presumably lead to the most success, so he's quickly running over one country after the next.

GENERALS COLLABORATE
TOGETHER IN REAL TIME

Generals are collaborating in real-time with cannon, gun, and ammo makers; ensuring invasions are planned according



to delivery schedules. With every victory, they are sharing information about what is working. More importantly, visibility across

NAPOLEON GAINS VISIBILITY
INTO NEW OPPORTUNITIES

all battlefields is positively impacting strategic and tactical decisions, allowing Napoleon to redefine goals and priorities. In fact, with a detailed report on weather conditions, he



proactively decides sending 600,000 troops in the middle of winter to knock on Alexander's door in Moscow isn't exactly the best idea.

With Novient's technology, Napoleon could have created a global empire that might still be dominating the world today. And being French, you'd now have three hours in the middle of the day to eat lunch and take a nap.

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AND STILL GOING STRONG

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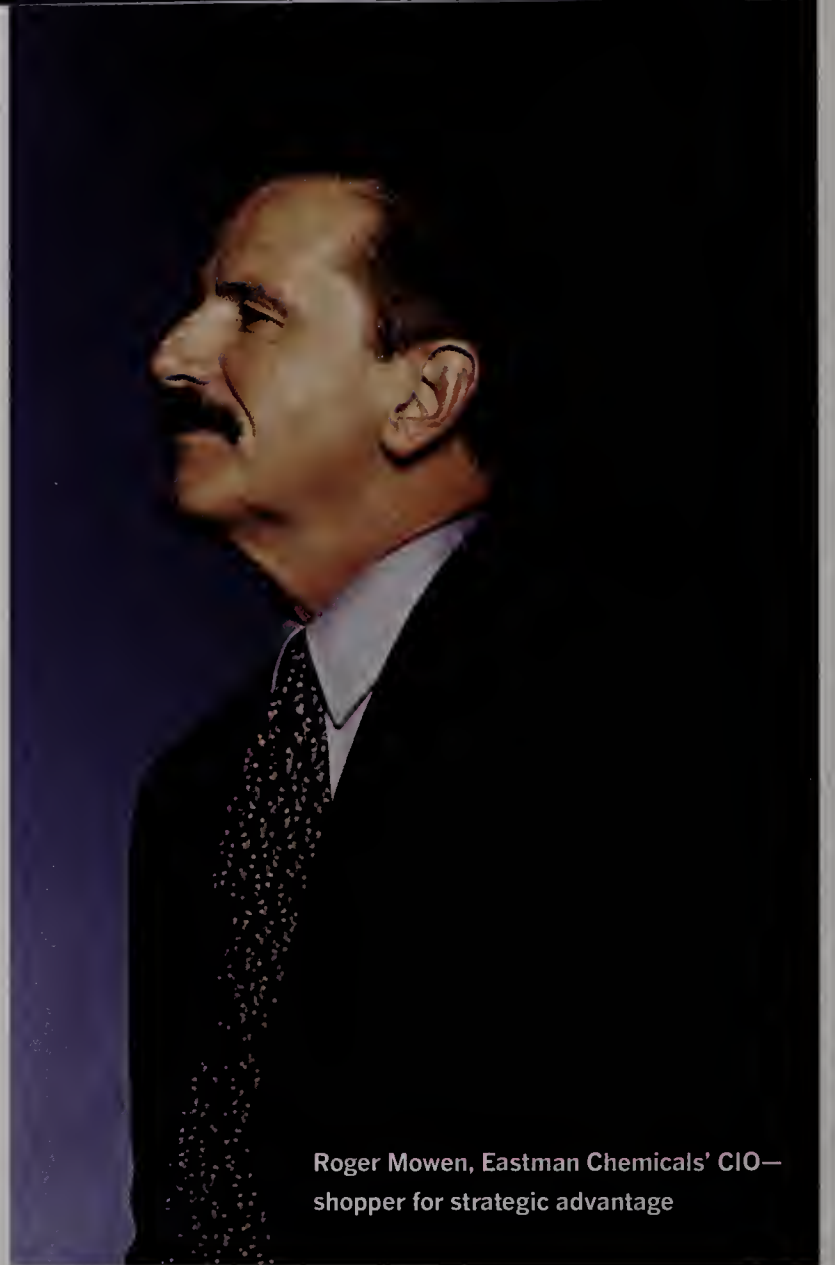
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COVER STORY PAGE 86

Nothing Ventured, Nothing Gained

To maintain a competitive advantage, today's business needs to invest in innovative technologies. Who will lead the enterprise's investment strategy and manage its technology portfolio? You, the CIO. Is it risky? You bet.

By Ben Worthen



Roger Mowen, Eastman Chemicals' CIO—shopper for strategic advantage

COVER PHOTOS BY MARK VAN S.

The Hype Stuff

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WEB TECHNOLOGY: XML Will XML be the ultimate platform? Or will it be the next EDI? *By Scott Berinato*

Hello, Dolly!

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CASE FILES: CUSTOMER FOCUS A virtual, Web-based call center helps this custom doll maker find made-to-order agents. *By Esther Shein*

Faster, Cheaper ERP

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ERP STRATEGY ERP doesn't have to cost an arm and a leg and take several years. Here's how midmarket companies get it done fast and cheap. *By Lee Pender*

The High Price of Age Discrimination

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STAFFING Whether it's illegal, unethical or simply bad business, too many IT veterans are getting left behind in a labor market that needs all the talent it can get.

By Sarah D. Scalet

What a Switch!

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CRM: UTILITY INDUSTRY Before deregulation, utilities didn't have to worry about customer service. Now they do. But buying CRM software won't do the trick.

By Heather Harreld

The Great Debate: IT & Productivity

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I.T. VALUE: POINT/COUNTERPOINT Did IT drive the productivity miracle of the late '90s, or was it just a passenger on the bus?

By Edward Yardeni and Robert Gordon

MORE ►►►

APPLY FOR CIO'S Enterprise Value Awards

How does your company measure up? The 2002 Enterprise Value Awards application follows Page 162.



Not Just Another Pretty Interface.



Introducing Jasmine® *ii* Portal. The eBusiness Workplace That Empowers Your Organization To Win At eSpeed.

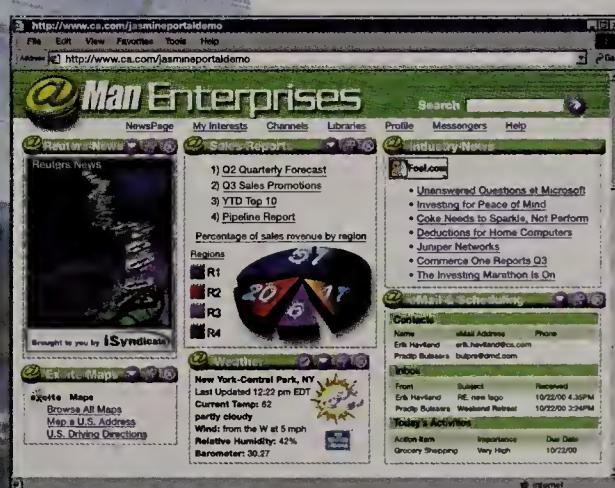
On the surface, most portals look and function the same. But one is dramatically different from all the rest — the Jasmine *ii* Portal. While some portals only let you customize their content, Jasmine *ii* Portal's **dynamic personalization** goes one step further. It intelligently finds information that other portals might not even consider delivering to users.

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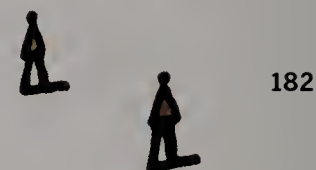
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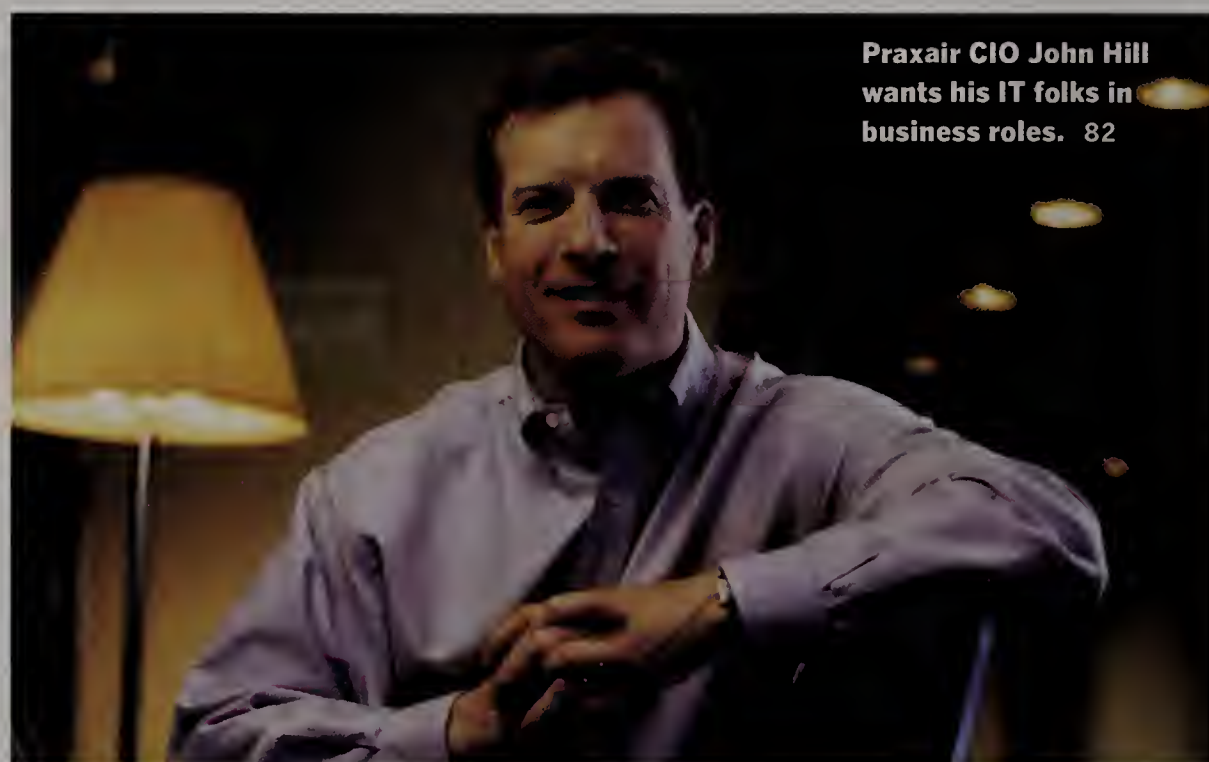


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MARKET FACT

The editors of eWeek magazine recently gave its coveted and rare Analyst's Choice Award to Microsoft BizTalk Server 2000. The publication praised BizTalk Server 2000, calling it "an excellent platform for managing XML data processing among businesses."

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MONDAY – Tech Tact: New Tools for New Jobs

Technology Editor Christopher Lindquist on what's coming and what it's good for. www.cio.com/online/techtact



Lindquist

TUESDAY – Quick Poll Report

Hundreds of CIOs can't be wrong. Or could they? What information executives think about current issues and why. www.cio.com/poll

WEDNESDAY – Metrics

Industry numbers that matter from the country's most reputable analysts. www.cio.com/metrics

THURSDAY – Sound Off

For opinion on managerial, political and ethical dilemmas that confront CIOs daily, read Senior Web Editor Martha Heller's column and join the debate. comment.cio.com



Heller

FRIDAY – The 35 Cent Consultant

Executive Editor Derek Slater responds to readers' inquiries about everything from ERP to extranets. www.cio.com/35cent

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Find out which CIOs are moving up and moving on. www.cio.com/CIO/movers.html

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How to Change Your Customer's Mind

The true story of an IT services department that swapped its bad attitude for a good one and became friends with the whole company. Could they all live happily ever after? www.cio.com/archives/051501/change.html



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Salesperson: "Check delivery status."

Informio: "Please say client name."

Salesperson: "CTL Research Lab."

Informio: "GeneScreen 1200 ships
to CTL Research Lab Wednesday."

Salesperson: "Credit status."

Informio: "Preferred."

Salesperson: "Request client
change order."

Informio: "Describe change."

Salesperson: "Add 1 storage unit –
SKU 7342."

Informio: "SKU 7342 available."

Price: \$12,756. Order amended."

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So, now what?

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communication

From the Editor

lundberg@cio.com

The View from Here

I was recently asked to give my views on the state of CIO affairs. How is the economy affecting CIOs' plans, budgets and influence? Here's what I'm seeing.

While the slowed economy is causing CIOs to significantly scale back the somewhat extravagant plans cooked up a year ago, they still intend to spend more than last year. In CIO's March 2001 Tech Poll, done in partnership with Yardeni.com, panelists said their budgets would grow by 9 percent during the next year, compared with the 19 percent increase they predicted last November. (For details on the poll, visit www.cio.com/online/040901_techpoll.html.)

During the last two years, business units and departments feeling the urgency to become e-enabled spent many discretionary dollars on new IT initiatives. As these dollars dry up, IT decision making will return to the centralized control of IS. In fact, over 40 percent of respondents to a study by Robert W. Baird & Co. indicated that IT decisions will be more centralized in 2001. This centralized control, however, will be much more flexible and inclusive than in the past.

These two factors—slowed investment in new initiatives and the return of control—will give CIOs the opportunity to complete the work they began a few years ago: rebuilding their infrastructures. This means integrating existing systems with new customer front ends and supply chain extensions. The focus will be on robustness, reliability, security and seamlessness.

While the staffing crunch has eased because of the recent wave of layoffs and hiring freezes, there's still not an abundance of qualified IT workers, and CIOs will continue to explore new sourcing options. (For an often overlooked source of talent, see "The High Price of Age Discrimination," Page 134.) Anything not considered core or strategic development is a candidate for outsourcing.



CEOs and shareholders are more eager than ever to get some payback from the unprecedented spending of the last couple of years. So while new technologies continue to be high on the list of CIOs' interests, the main thrust this year is not to break new ground but rather to rationalize and make bulletproof the still nascent IT-enabled enterprise.

Allie Lundberg

P.S. In order for businesses to adapt more rapidly in the evolving economy, future leaders must have the same information as incumbents. Therefore, CXO Media and the staffs of CIO and Darwin magazines are supporting education and lifelong learning through our editorial coverage and our various projects at colleges and universities across the nation. As part of this effort, we are pleased to sit on the advisory board of Pace University's School of Computer Science and Information Systems and sponsor its Award for Leadership and Service in Technology. We congratulate this year's winner, Leslie Tortora, managing director and CIO for The Goldman Sachs Group, who will be honored June 11 in New York City.

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InBox

Reader Feedback

KEEP CHANNELS OPEN

I couldn't agree more with "Channel Crossing" [Feb. 15, 2001]. Disintermediation was a tempting strategy for uninformed manufacturers in the early days of e-commerce. But when a little math was applied, they quickly discovered the value of those channel relationships. Smart companies like Whirlpool offered their independent dealers website services way back in 1996, letting them include competing brands on their sites. Dealers could promote their products and services on the Web, receive consumer sales leads from the manufacturer and secure B2B communications.

The article pointed out the wisdom of reinforcing existing channel relationships by helping channel partners reduce costs and increase their sales effectiveness using the Web. This is the promise of the Internet that often gets overshadowed by many high-profile "dot-bomb" failures. Thank you for reporting on those business strategies that spell success.

Brett Knobloch • Executive Vice President, Dealer E-channel •

JGSullivan Interactive • Chicago • brett.knobloch@dealerechannel.com

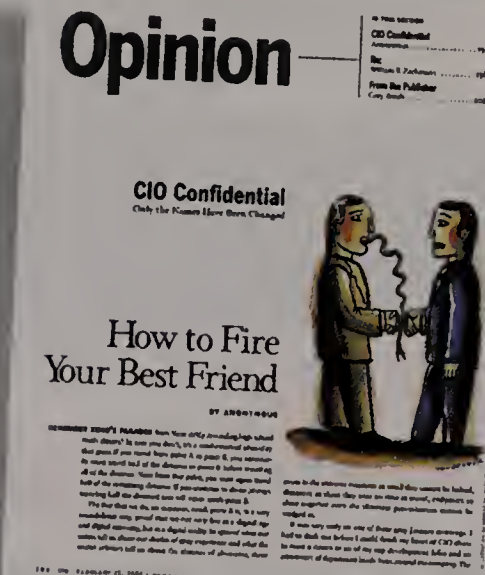
READER REACTION TO CIO CONFIDENTIAL

Please cancel my free subscription to *CIO* immediately. I was extremely offended by comments about [Chairman and CEO] Larry Ellison and Ora-

In the spirit of camaraderie among writers, let me offer my unsolicited general impression of *CIO*: It's empty, void, no depth, no content, no value, no information, no interest. A complete zero—no wonder it's given away.

Robert Allred

Oracle Corp.



cle Corp. in the Feb. 15, 2001 *CIO* Confidential column ["How to Fire Your Best Friend"] and do not want to be associated with *CIO* or Anonymous's general impressions in any way.

THE ROI OF ROI

I enjoyed "Measuring the ROI of Training" [Feb. 15, 2001]. Because I've spent a few years working in evaluation and ROI and I'm familiar with the work of Jack Phillips, I would like to offer a couple of comments. First, I agree that companies planning to roll out a software program don't have to do ROI on the accompanying training. That said, I think companies should analyze the cost side because it's their responsibility to provide training as cost effectively as possible, and a partial ROI analysis will help with this.

Second, I believe there are two parts to analyzing learning (the article's second step in determining ROI). Finding out if learning took

place is the first part, but furthermore, you need to determine if the training organization can demonstrate that the skill being taught was used and applied during the learning experience. The article's third step in determining ROI—analyzing the skills gained over the long term—should cover the use of the knowledge and skill analysis in the field, the extent of the use, and an environmental study for what I call the enablers and barriers to use.

You cannot get a positive ROI without knowledge and skill transfer. I believe that ROI analysis and evaluation starts at the very beginning; early on the trainer should lay out an evaluation plan and determine strategies for knowledge transfer.

I believe we focus on the wrong issue. While ROI is important (and it is only one way to demonstrate value), it answers the question, "What did I get for my money?" I think we should be asking, "How do I get something for my money?" This is the more critical question, and if we solve the issues of design and transfer, the ROI will most likely go away.

Donald V. McCain

Principal

Performance Advantage Group

Brentwood, Tenn.

donpag@bellsouth.net

CHIEF LISTENING OFFICER

In a previous life I was a frustrated IT employee who could not figure out why the idiots in the business groups just didn't get the cool technologies [From the Editor, "Gluttons for Punishment?" Feb. 15, 2001]. And then a

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Platforms for e-Business Leadership

Are you really getting the value your company needs from your business-critical applications? Are those applications true e-business assets?

"To answer 'yes' to these questions about your company's enterprise server architecture, certain requirements must first be met," notes Rodney Sapp, Director of Product Management and Marketing for ClearPath servers at Unisys.

- Underlying hardware architecture must combine powerful processors with main-frame design concepts to deliver value and modularity.
- The hardware platform must meet rapidly changing business requirements and allow for simultaneous deployment of current processor technologies and operating systems.
- Your enterprise server platform must offer capacity on-demand to meet the unpredictable needs of your e-business without forcing you to pay for over-capacity.

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miracle happened: I started listening—I mean really listening—to other people. And I began to grow as a person and as a valuable employee. The lesson I learned then that helps me every day is that you should listen with empathy before you speak, grumble and give up.

Today, as the CTO of a professional services company, my most important job is to listen to my CEO, CFO, clients and employees. I am responsible for growing the practice by developing the vision and strategy for emerging technology. That is my role—to lead and produce results—and the only way I can do it is by listening. To develop and deliver intelligent solutions day in and day out, I have to listen to clients, employees, vendors and pundits constantly. Listening, not because I can then start speaking, but listening so that I understand the people, processes and technology so that I can provide them with solutions that they need, not what we sell.

It doesn't matter whether you are the CIO or CTO or any other "CO." At the end of the day, if you have to deliver, then you need to listen before you produce.

Jay Jayamohan
Vice President and CTO
Comter Systems
Fairfax, Va.
jjayamohan@comter.com

DEFENSIVE MANEUVERS

Brett Dorny's Fine Print column ["Intellectual Piracy," Feb. 15, 2001] encourages CIOs to patent all possible technology, software and business methods to stem competition. While his caution is warranted in today's marketplace, across-the-board patenting may not be the most savvy, efficient or inexpensive way to manage intellectual property.

The United States is experiencing overwhelming patent growth, up 36 percent in the past two years. With this increasing volume, patent offices world-

wide are more frequently issuing "bad" patents—that is, they are approving concepts that already exist. Companies that are needlessly racing to the patent office are causing the system to become overloaded and even more ineffective.

Moreover, the cost of patenting can become prohibitive for all but the largest companies. A single U.S. patent costs approximately \$15,000 for processing. Add in the price of litigation and maintenance, which runs about \$250,000 for the life of a patent, and spending can become outrageous.

Defensive publishing is a newly revived alternative in the IP space that is highly effective when used in tandem with patenting. This technique calls for companies to patent a core innovation and then push any incremental innovations into the public domain, preventing competitive claims. A defensive-publishing service offers online disclosures of "prior art," which can be posted inexpensively, accessed by many of the world's major patent offices and admitted in court if necessary.

Without doubt, IP methodologies are being expanded to better meet the needs of today's companies. To take advantage of these new tools, managers would be well-advised to seek counsel from corporate or third-party intellectual property specialists who can recommend an integrated approach that combines patenting, defensive publishing and trade secret retention to best meet their individual needs.

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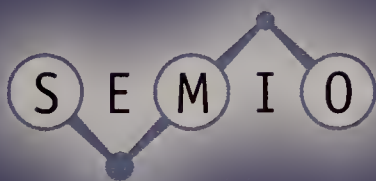
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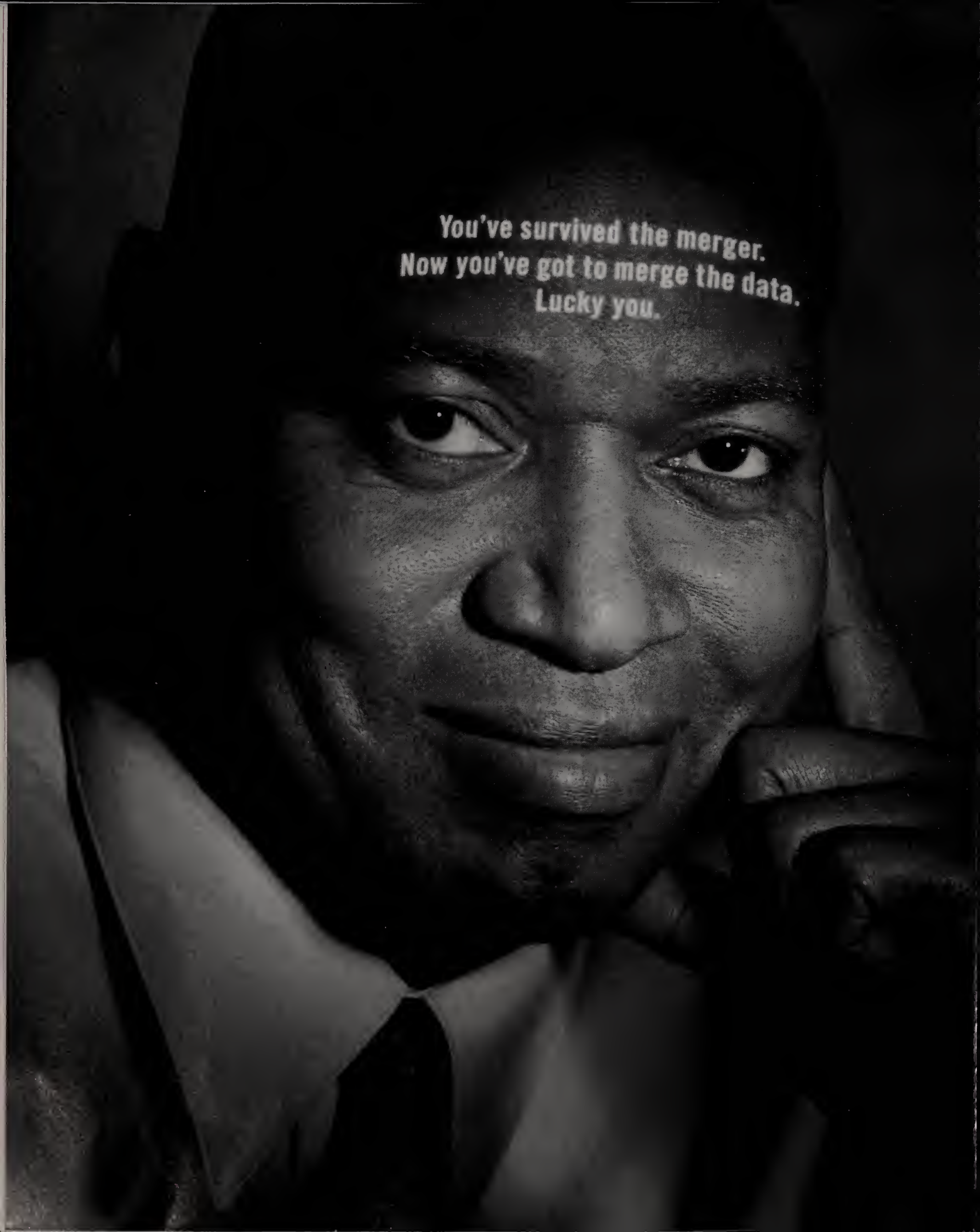


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Edited by Sandy Kendall

EDUCATION

A Handful of Learning

By Meredith Levinson

AT RIVER HILL HIGH School in Clarksville, Md., 15 ninth-graders in an honors English class are using handheld computers to study William Shakespeare and Edgar Allan Poe, write letters to the editor, and critique and edit their peers' work.

The freshmen are part of a pilot program launched Oct. 3, 2000, to explore how technology—in this case PDAs provided by MindSurf, a Baltimore-based wireless infrastructure company—can enhance education. They're using iPAQs by Compaq with a Windows CE operating system that's loaded with Webster's Dictionary, Encyclopedia Britannica, and instant messaging and scheduling software to download assignments, take and share class notes,

hold online discussions and do research on the Internet.

"Because the [handhelds] have Internet capability, we can collaborate with other schools reading the same texts through bulletin boards and chat room discussions," says Rick Robb, the English teacher whose class is serving as beta testers. "The technology opens up the classroom to broader communication and broader research at an earlier level. Before, you could only talk to learned professors if you were in college. Now you can do it in the ninth grade."

Using the PDA also creates efficiencies for Robb, who no longer has to spend time photocopying worksheets and quizzes.

Robb, who spent 12 years in IT as a systems analyst before becoming a teacher, thinks using technology to deliver notes and assignments and to stimulate discussions will prepare his students

Continued on Page 34



Wireless learners at River Hill High School

Department of BIG, Scary Numbers

32 MILLION: estimated number of workers who work at home sometime during the week

40 MILLION: estimated number of workers who'll work at home sometime during the week in 2004

\$7.2 BILLION: estimated voice over DSL market in 2005,

156 percent increase from 2001

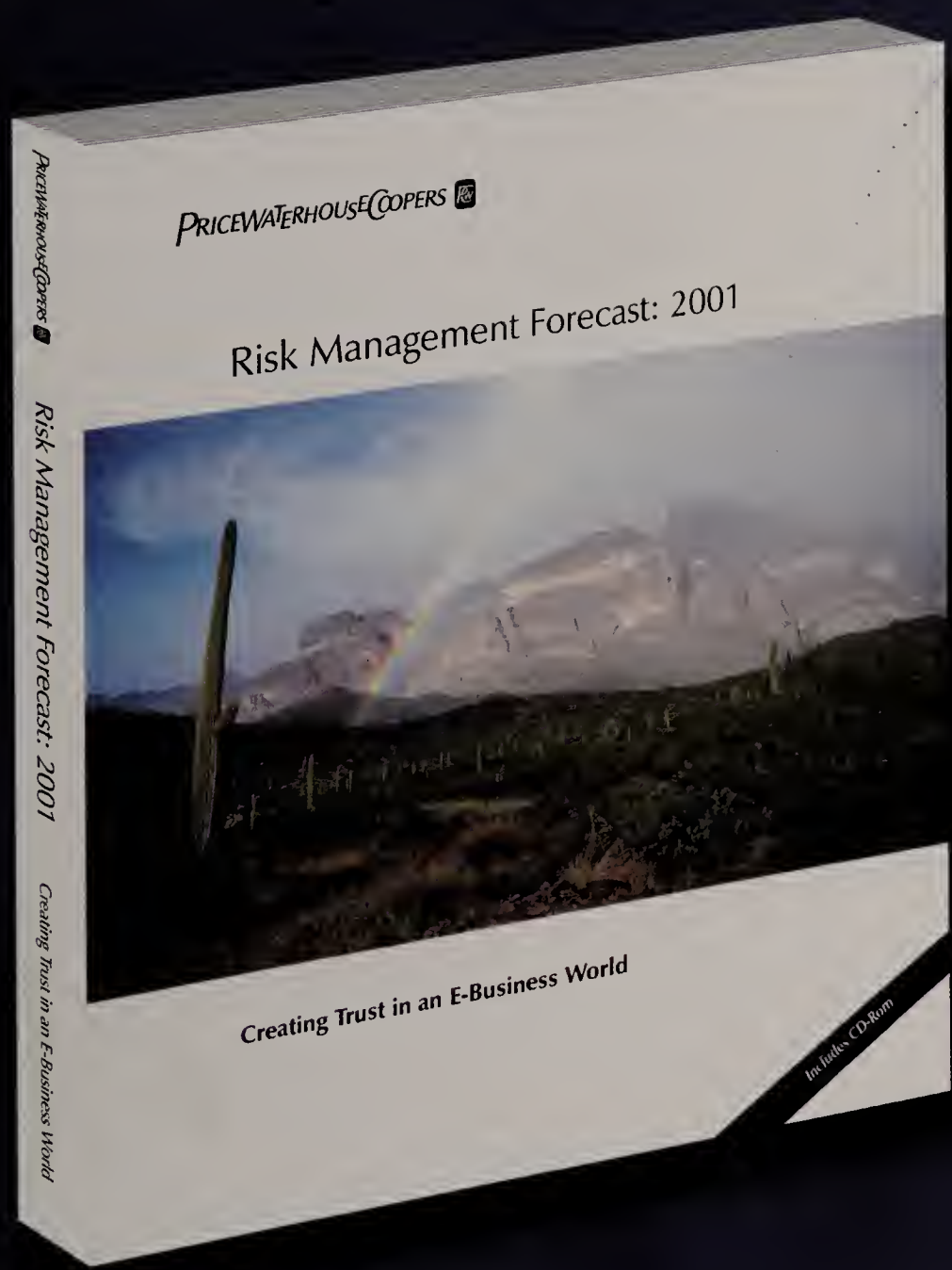
Sources: Research First Consulting, Cahners

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—Ellen Ullman, author of *Close to the Machine*, from "Talk of the Nation," Feb. 22, 2001

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A Handful of Learning

Continued from Page 32



to be productive members of the workforce. "It's helping kids use standards that are already in practice in business," he says. "Businesses spend a lot of money retraining college graduates because of the deficiency of technology education."

The program expanded to six additional ninth-grade classes and one eleventh-grade class at the beginning of February, and by the end of the school year, the entire ninth grade at River Hill High School may be using the devices. Eventually, Robb will find himself teaching the school the finer points of the PDA lingo that he and his students use as much as he finds himself teaching the students the finer points of English usage.

EMERGING TECHNOLOGY

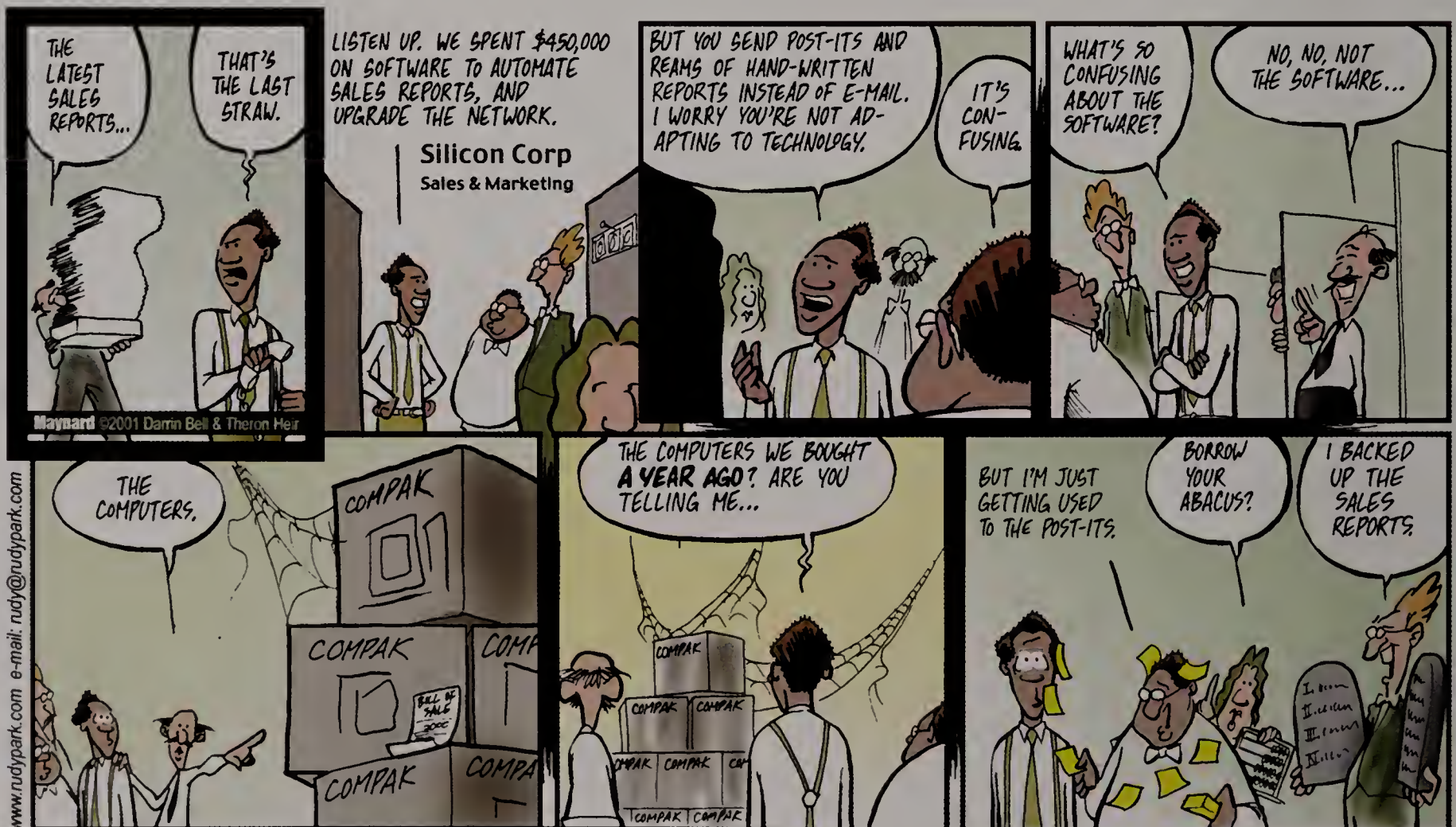
Future-Mothers' Day

SEEKING WAYS for technology to make things besides death and taxes more certain? Well, strides are being made toward certainty in another of life's basics, conception.

The Queen Phone by Samsung is a mobile phone that can reputedly predict its female owner's ovulation cycle. Already available in Korea for less than \$300, the slim red wireless unit can also estimate caloric intake. So handy!

If the would-be mother's phone is busy, ovulation info may be obtained from another, um, angle. Procter & Gamble is developing panty liners that indicate when the wearer is about to ovulate. Chemicals in the liner respond to body chemistry and change color. Other companies have pursued this, but P&G seems to lead the patent race. These products are not yet on the market, and when asked when we should...expect them, according to *New Scientist* magazine, P&G spokeswoman Sally Woodage says, "We never comment on upstream development areas." A good idea.

Maynard BY DARRIN BELL AND THERON HEIR



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Washington Watch

Edited by Elana Varon

Got Your Databases Covered?

WHILE THE RECORDING industry's battle against Napster grabs headlines, publishers of online databases are turning up the volume as they push for legislation to protect copyrights on their content. And Congress is listening. Earlier this spring, the heads of two key panels, **Reps. James Sensenbrenner (R-Wisc.)**, chairman of the House Judiciary Committee, and **William Tauzin (R-La.)**, leader of the House Energy and Commerce Committee, said they'll push for a measure that toughens protections against data piracy.

The publishers want to extend existing copyright laws to the information in commercial databases, allowing database creators to sue people or companies they think are illegally reselling their products. **Keith Kupferschmid**, a lawyer with the Software & Information Industries Association (SIIA), which represents the publishers, says a new law is needed because the Internet makes it easy to steal and resell information that database publishers package. A bill making database piracy illegal, sponsored by **Rep. Howard Coble (R-N.C.)** and supported by SIIA, died last year because of opposition from consumer groups and news organizations such as the American Library Association (ALA) and the Bloomberg Financial



William Tauzin

Markets news service.

While the ALA agrees data shouldn't be pirated, its legislative counsel, **Miriam Nisbet**, says Coble's measure went too far. She says it would have prohibited many legitimate uses of databases that are covered by current laws on "fair use" of copyrighted information, such as downloading news articles or financial data for research. The ALA supported a less restrictive bill introduced by former **Rep. Thomas Bliley (R-Va.)** that also went nowhere.

Now both sides are moving toward a compromise. Kupferschmid and Nisbet each say any legislation protecting database copyrights should let people use the information in databases as long as they don't resell it. Apparently so thinks Coble, who as chairman of the House Judiciary's Subcommittee on Courts, the Internet and Intellectual Property, is Sensenbrenner's point man for this issue. Coble's press secretary, Ed McDonald, says Coble is working on a compromise that focuses on the fair use of databases. McDonald says Coble doesn't want to restrict dissemination of information like stocks or financial statistics.

—Stephanie Viscasillas

Hold that Question

IT'S SPRINGTIME in Washington, D.C., and that means humidity and political agenda-setting, especially after an election. All governmental bodies are shaping up their list of issues to address, and that spreads even to international bodies like the World Trade Organization.

The WTO met earlier this month

to noodle over a set of policies that would govern international e-commerce transactions. You know, if you're in California and you download software from India, is that download the same as buying software on a CD, and therefore subject to a tariff? Will IT service providers such as telecommunications companies be allowed to offer their services in multiple countries? Do countries have the right to restrict foreign website activity, as France did last year in forbidding Yahoo's auction site to sell Nazi "memorabilia" to French citizens?

Sound familiar? These questions and more like them have been kicking around awhile now, while the needs of business press on. And despite the WTO's agenda, don't expect any definitive answers soon.



Robert Zoellick

It takes the WTO several years to issue new rules, says spokesman **Jean-Guy Carrier**.

We can't blame only the WTO for leaving us hanging. At press time, the Bush administration hadn't laid

out a specific e-commerce trade agenda. In March, U.S. Trade Representative **Robert Zoellick** told the House Ways and Means Committee that the administration would actively pursue free trade policies. Such policies usually include eliminating or reducing tariffs. —S. Viscasillas

"I believe government policy needs to migrate steadily toward the digital broadband future, but remain humble about what it does not understand and cannot predict."

—Michael K. Powell,
chairman of the Federal
Communications Commission

EMPOWERING THE INFORMATION-CENTRIC ENTERPRISE

Balancing Act

Meeting the Demands
of the Global Information
Economy

Inside:

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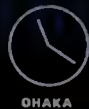
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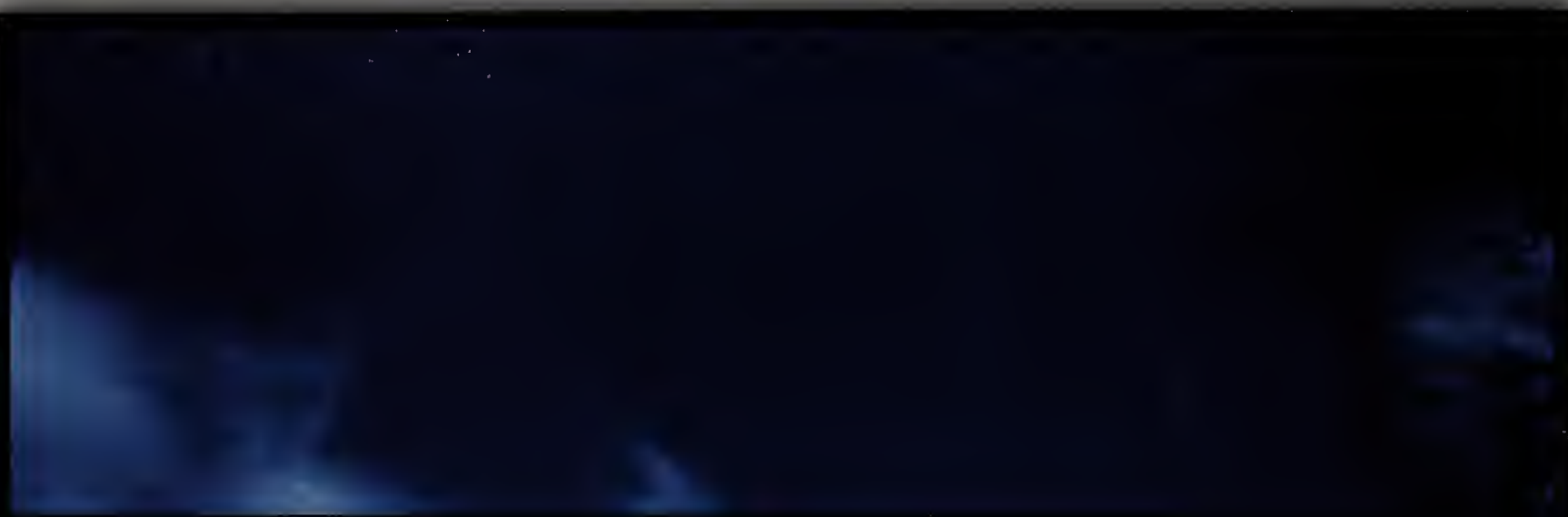
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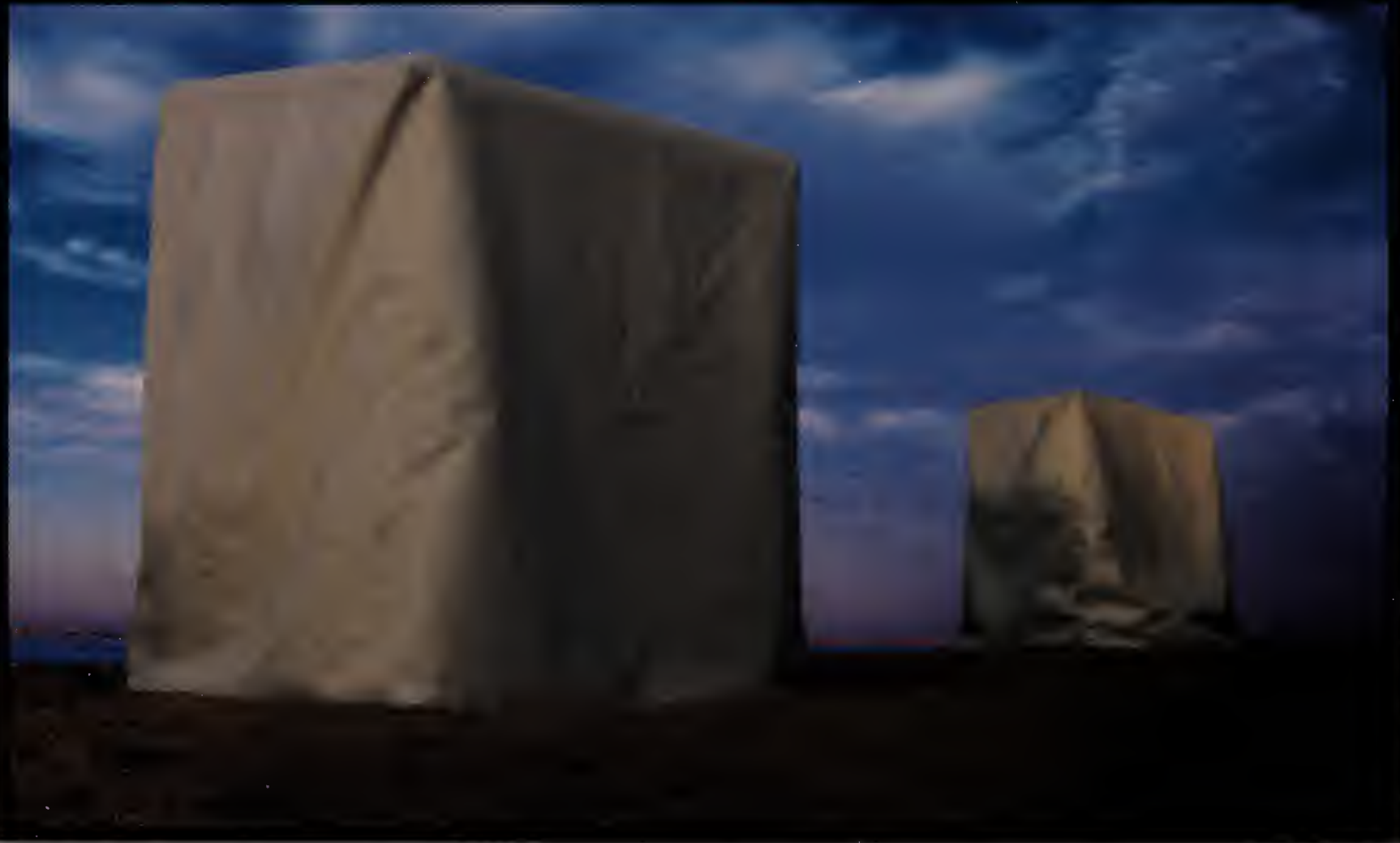
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Balancing Act: Meeting the Demands of the Global Information Economy



David E. Roberson
Chief Operating Officer
Hitachi Data Systems

The information economy has changed the rules of business for everyone. But above all, business agility distinguishes today's winning enterprises. In practice, this means shorter time to market for new products, faster customer service response times, and becoming a leader of tomorrow's trends, not merely a follower. At the heart of this agility lies sharper insight into the meaningful patterns of corporate information.

How does a company become agile? And how does it shift into an increasingly knowledge-based business world? By having continuous access to every bit and byte of data needed to stay in touch with a world that never shuts down. To achieve this, a company needs a solid IT foundation with unparalleled reliability. Certainly in our daily lives, we have come to expect any technology we use to be dependable and virtually invisible. This is true whether it runs our homes, transportation systems or supports our leisure activities. We should expect the same of the technologies that run our critical business functions.

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We set extraordinarily high standards for our products; they enable our customers to do the same.

Best Regards,

A stylized, handwritten signature in black ink, appearing to be 'D. Roberson'.

David E. Roberson
Chief Operating Officer
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Surviving in the Age of the Information Economy

Data storage has transformed from a peripheral role to a mission-critical strategic function. Has your storage infrastructure evolved to meet the challenge?

Today's storage challenge is a numbers game. And not just in terms of gigabytes or performance. While large, fast data banks are de rigueur, meeting the demands of the information economy takes more than that. Data must be accessible 24 hours a day, seven days a week, with zero downtime or margin for error.

At the same time, modern corporations need to plan for rapid growth in areas like CRMs, data mining, enterprise resource planning, and online business, which means storage capacity that can be reallocated and scaled as needed, up or down, at the flick of a switch. When 100,000 new customers come to your site because of a mention in a TV show or news article, you can either be prepared to capture this new market, or be overwhelmed.

Capturing market share is important, but capturing strategic data about your customers is equally so. In the information economy, the company that can collect, analyze, make sense of, and act on that data will be the winner.

The Big Wave in Storage Needs

All that data will need to be stored in repositories that are growing at increasingly fast rates. Amazon.com alone adds 42 terabytes of customer and product information every six months; Mail.com adds 27TB every 45 days. In the financial services area, Citibank has collected 75TB of data in 10 years.

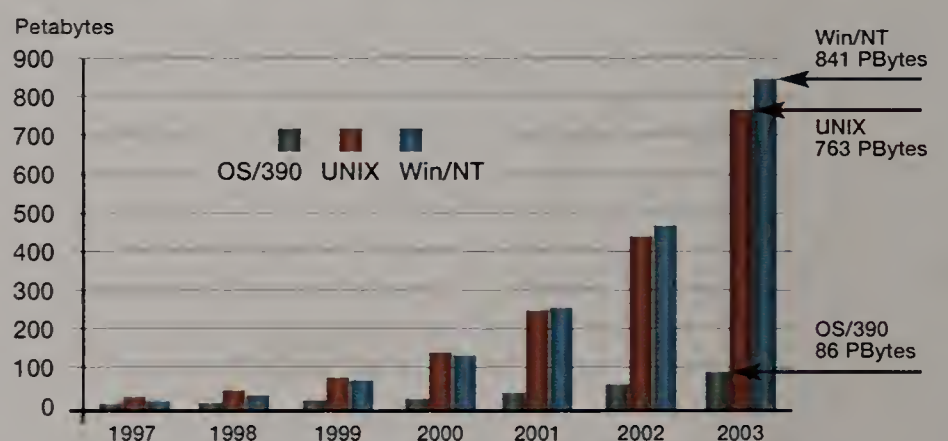
And that doesn't even touch upon the demands of multimedia, such as images,

audio, and video, which require vast amounts of space. Nor does it consider the wireless commerce revolution, which will see exponential growth in cell phone and PDA transactions, or the expanding use of digital cameras and video for personal applications.

Agile and opportunistic companies are looking for ways to mine all that data for competitive advantage. For example, customer resource management software has evolved from sales support into lead generation and marketing; while in retail, bricks-and-mortar stores are linking up with their online counterparts to unify the customer experience and provide cross-promotion.

Information Tidal Wave

By 2003, the need for data storage will have grown by a factor of ten, largely due to the demands of the information economy.



Source: IDC, 1999 Worldwide Disk Systems Market Forecast and Review by Robert C. Gray
Notes: Years 1999 through 2003 are estimates. 1PByte = 1,000,000 GBytes

Tipping
the
Scales

"The environment that we're in says we must provide continuous data to our customers. By that I mean service delivery with zero interruption.

— Steve Dean, Manager of Enterprise Computing, Texas Instruments

It's not just dotcom startups collecting data, however. Other examples are the transportation industry, where online reservations are becoming the rule rather than the exception, and even government, where online tax filing will soon be the norm. Online entertainment is also poised for enormous growth as broadband access becomes prevalent.

Meeting the Challenge

Riding the information economy's big storage wave will require massive changes in how companies view, manage and store their data. It's already clear to most CIOs that flexible and immediate access to valuable data, on a 24/7 basis, is mission-critical. What's not as clear is how to accomplish that task.

Current storage norms, where most servers have their own dedicated storage capacity, are problematic. Not only is it extremely difficult to manage a system with storage spread out in so many places, much of the total space is wasted, and difficult to reallocate as needs change. Furthermore, such systems need backup and maintenance that can result in unacceptable downtime.

To solve these issues and allow companies to move at Internet speed, major changes in infrastructure are needed, as well as integration of legacy systems with new-line business. Solutions like storage area networks — SANs — (which centralize data resources) and storage on demand (which allows instant scalability) will become the keys to meeting the data storage challenge.

But on an even higher level, a new class of storage is needed: carrier class. Carrier-class storage is 100 percent reliable, scalable and flexible. For example, telcos will move to provide large-scale storage services to their customers, moving the data over their new high-bandwidth pipes. Value-added services could include backup and disaster recovery, video-on-demand, and hot restart.

Yankee Group analyst William Hurley believes that carrier-class storage is required to meet the 400 percent compound annual growth rate of storage service providers, and that it will have four main attributes: seamless capacity scaling, flexible management, simultaneous serving of a variety of data types, and infrastructure consolidation. Hurley also believes that Hitachi Data Systems' Lightning 9900 is the only storage system that meets carrier-class requirements.

The Global Information Utility

Hitachi Data Systems, a subsidiary of the \$75 billion Hitachi Ltd., has been focusing on the need for carrier-class storage for a while now, coming up with cutting-edge solutions that have drawn sweeping praise from analysts. In the process, it has reinvented itself as a provider of information infrastructures that act as a global information utility, delivering always on, adaptive, efficient, cost-effective and secure storage solutions.

For instance, Hitachi Data Systems' Just In Time Storage utility — the first large-scale storage-on-demand solution that is

Global Information Utility

The attributes of carrier-class data storage for the information economy resemble those of a traditional utility:

- **Forever on:** Data storage is mission-critical. Downtime is not an option.
- **Adaptive:** Storage systems must be able to anticipate and adjust to the inevitable rate of change.
- **Fluid:** Dynamic management optimizes performance.
- **Seamless:** Continuous scaling of performance, capacity, and connectivity is required.
- **Secure:** Systems must meet the challenge of wider authorized access, while strengthening controls and availability/recoverability.
- **Efficient:** At this scale, value and performance will continue to be a factor.
- **Cost-effective:** Systems must deliver business value at reasonable prices.
- **Intuitive:** Automated intelligent tools offset the massive scope of storage to be managed.



operating system independent — gives companies instant access to capacity, host connections, and cache at the touch of a mouse.

Hitachi Data Systems has also teamed with Microsoft Corp. and McDATA Corp. to offer availability, scalability, and reduced cost of ownership for Microsoft Exchange and SQL Server environments via the Microsoft Trusted Solutions Platform, in which Hitachi is the sole storage provider.

And Hitachi Data Systems is redefining SANs with a new paradigm called Freedom Data Networks, which combines all networking technology, including Storage Area Networks, Network-Attached Storage, LANs, and WANs, providing six to 10 times the performance of traditional storage connections.

The Open-Storage Solution

The starting point for a new data storage infrastructure is separating storage from server. In the past, storage was typically purchased from the server vendor. However, the percentage of storage purchased from server vendors has been decreasing by about 2 percent a year. Now, 74 percent of all storage is bought from server vendors. By 2003, analysts expect that number to drop to 50 percent or 60 percent.

Balancing Act: Meeting the Demands of the Global Information Economy

Like many of the developments in the new world of open-systems storage, this trend mimics what happened in the OS/390 world. "The predominant OS/390 storage vendor, IBM, lost market share because companies realized they could go outside that umbrella for better reliability and functionality," says Mel Tungate, Director of Storage Marketing for Hitachi Data Systems. Now companies are being driven to find new solutions as they begin to appreciate the vast amount of connectivity required in

storage and the new functionality available in storage devices. "The server vendors haven't done as much as the nonserver storage vendors," Tungate says.

Hitachi Data Systems has long been a leader in OS/390 storage and learned valuable lessons there. Ironically, however, the disciplines that Hitachi honed in the OS/390 world are now being embraced by the open-systems storage industry. As recent as a year ago, some firms were still comfortable being able to

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"A storage infrastructure could become more valuable over time, as you move up the value chain and focus on data as a competitive advantage."

— David E. Roberson, Chief Operating Officer, Hitachi Data Systems

recover from a complete outage in four days, and occasional hours or days of website downtime were considered a cost of doing business.

Now, of course, information economy firms need continuous operation, à la OS/390. "Certainly, if you look at the OS/390 hardware, typically that's been more reliable than what you found in UNIX and Windows NT," says Dave Roberson, Chief Operating Officer of Hitachi Data Systems. "We've been designing at a higher level for sometime, which is why we are further ahead technologically than many others in the open-systems storage world."

Putting Storage Area Networks to Work

One of the keys to implementing storage for UNIX and Windows NT systems is the storage area network. And Hitachi Data Systems is at the forefront of SAN technology as well. "We have installed more than 300 large SANs worldwide and I'd suggest no two look alike because no two customers or applications look alike," says Don McNicoll, Director of Product Marketing for the Hitachi Freedom Storage line.

Some companies put all their data into one SAN fabric. However, Hitachi has also created separate SAN fabrics for one firm. Reason: One of the firm's groups had an online banking application that can never afford to be down for maintenance. For this application, the group wanted its own SAN that used a more expensive McDATA Director, a nonstop, high-availability system with multiple processors that have fail-over capability.

At first glance, the idea of having separate SANs might seem counter-intuitive. "Some people would say we are not accomplishing anything because we are creating islands of SANs," says Hu Yoshida, Vice President and Chief Technical Officer, Hitachi Data Systems. "However, our large global cache machines can put island of SANs in front, while in back there is one large storage pool that can allocate resources and manage from one central point."

The flexibility of SANs can bring unexpected benefits. For example, one large bank installed an Hitachi Freedom SAN for communication between storage and servers, but then found that it could also use the SAN for data transfers between machines. Instead of using file transfer protocol (FTP) over the LAN for backups, they now send command information over the LAN, and do the data transfers over the SAN. This makes backups much faster.

The main point is that no ideal storage device or architecture exists, not even one ideal device that will fit the needs of a single company. "There isn't one answer," says Hitachi Data Systems' Roberson. "Different companies — even different applications — will have different needs. So trying to do everything using one model doesn't make sense. Openness and choice is a good thing."

Consider the Hitachi Freedom Storage Thunder 9200 and Lightning 9900 units. The Thunder 9200 is a highly modular

storage device that uses a more traditional dual controller internal bus setup with multiple Fibre Channel arbitrated loops in the back and two interface power controllers out front. The Freedom Storage Lightning 9900 has a more monolithic structure with a centralized cache and huge amounts of internal bandwidth capabilities, which can be delegated a lot of intelligence. Both machines do remote copying. However, on the Lightning 9900, this can be done internally and with some sophisticated security domains that Hitachi extracted from the mainframe environment.

"If a customer put every scrap of data on a Lightning 9900, some of it would be overpriced because they would never use the full capabilities of the system," McNicoll says. "But if you put everything on a Thunder 9200, it wouldn't be able to deliver the flexibility of the 9900." The two systems complement each other very well to provide maximum benefit, at lowest cost, which is the whole attraction of open storage.

Even the mantra of centralized storage has exceptions. "EMC thinks that ultimately all storage will be centralized," Roberson says. "There is certainly a need for centralized storage, but there is also a need for decentralized storage." For example, one large Hitachi Data Systems customer has a storage system in every store. "If you had infinite bandwidth that was infinitely cheap, perhaps you could have one huge data center that controls all the data, but I don't see that happening in the next five years," Roberson says. "You need centralized management, not centralized implementation. Anyone who tells you there is only one answer is wrong."

Hitachi Data Systems' approach advocates openness, which allows an infrastructure to grow, change, and put different technology in place. "As much as I'd like you to buy all your storage from us, we don't try to force you into one backup vendor or backup strategy," McNicoll says. "We try to provide an infrastructure where you can leverage all the backup players."

Providing Solutions Through Collaboration

A cornerstone of this approach is Hitachi Data Systems' efforts to forge numerous partnerships with other leading industry players — including heavyweights such as Microsoft Corp., VERITAS Software Corp., and Brocade Communications Systems Inc. — to provide storage solutions that use the best of every kind of technology available.

For instance, Hitachi Data Systems has banded together with Microsoft and McDATA Corp. to introduce a packaged com-



Hu Yoshida
Vice President and Chief Technical
Officer, Hitachi Data Systems

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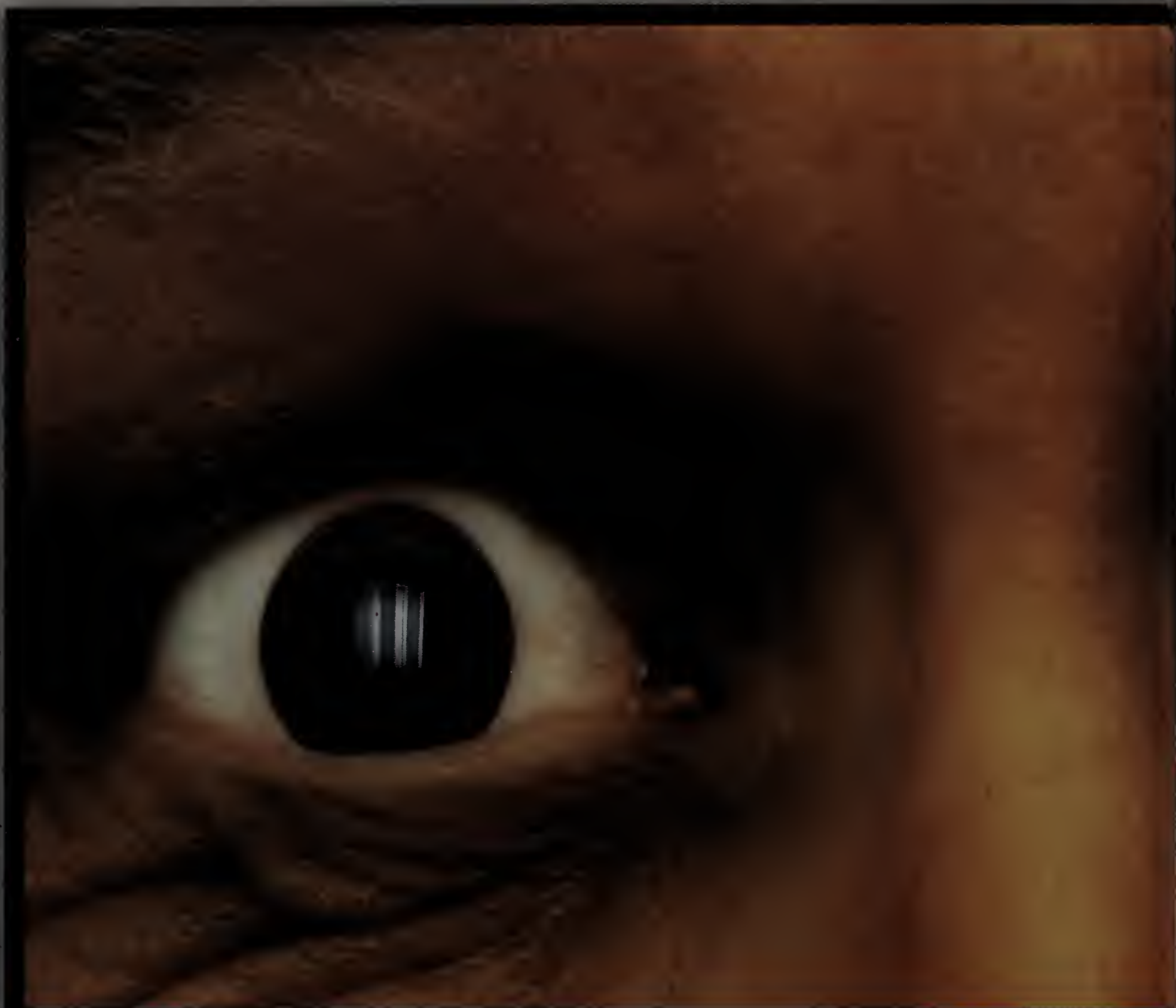


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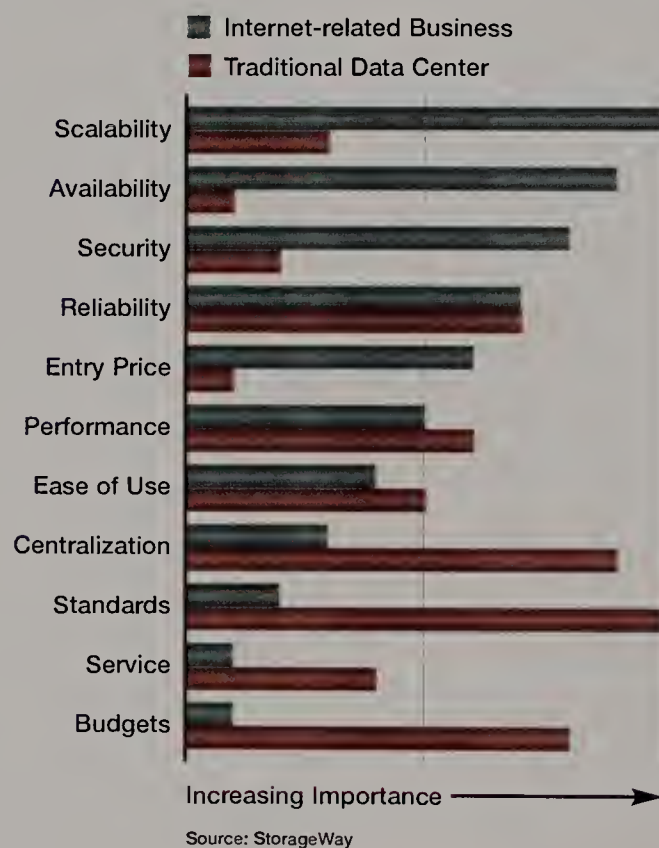
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bination of hardware, software and services called the Microsoft Trusted Solution Platform (TSP) that delivers highly available and scalable solutions for companies running Microsoft Exchange and SQL Server applications in a Windows 2000 Advanced Server environment.

"This three-way relationship brings a solution to bear that resolves a specific operating pain in and around the enterprise," says the Yankee Group's Hurley. "As these systems have become central

Changing Storage Priorities

Storage priorities have flip-flopped in the age of the information economy. Scalability, availability and security are the new watchwords. Hitachi Freedom Storage and Freedom SAN lead the industry in these categories.



business operations, a new manner of architecture that brings highly reliable solutions has become necessary. TSP is such a solution."

"We don't think we can do everything as well as others can," Roberson says. "We would rather collaborate than control. I can't be a world-class provider of every piece of storage infrastructure. Let others build those technologies. We'd like to work with the industry to create standards that everyone can build to."

Reaping the Rewards

Companies that have implemented open-systems storage are reevaluating the kind of payoff that mining their data repositories can bring. In the past, storage has been considered a cost. Companies just wanted to lower the cost of computing per terabyte. "We vendors trained them to do that," Roberson said. "We kept lowering the price of storage." As a result, companies became tremendously proficient at keeping data. Now companies are taking the next step and wrestling with how they can turn that massive amount of data into a competitive advantage, particularly as the economy slows.

"We're used to depreciating IT assets over time because those assets become less and less valuable over time," Roberson says. "But a storage infrastructure could become more valuable over time, as you move up the value chain and focus on data as a competitive advantage."

These advantages could be as elementary as new billing statements. "I get several different statements from my telephony provider for different services," Roberson says. "I would pay more to have that in one bill for convenience sake. But they say they can't do that because the information is in different databases."

Using new storage techniques to combine this disparate information creates new selling opportunities and products. One theme-park company, for instance, is building a large application that tracks information on frequent visitors, such as how much time they spend at a particular property. This, of course, will allow the company to target better offers to those valuable customers. However, another tack this company is taking is giving out Palm Pilots to certain visitors, allowing them to prebook times for rides so they don't have to stand in line.

This will certainly enhance the visitor's experience. "But another question is how much money do people spend while they are standing in line?" Roberson says. "The answer is zero. This company wants to orchestrate your experience with them so you never stop spending money."

A key to reaping more benefits from storage is to recast the storage infrastructure so it is focused from the customer in rather than from the technology out. "IT folks need to stop looking inside and look out at their customers," Roberson says. "They need to begin to understand how they can add value at the customer level. That's where many of the dotcoms fell down — they never really took time to understand what people would be willing to pay for."

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the
Scales

"We must have 100 percent reliability and 100 percent uptime. That's what our customers want."

— Peter Cederqvist, IT Leader at Nocom.net

"Hitachi's 7700E and Lightning 9900 series offer a guarantee of accessibility or availability that is extremely unique in the industry." — Cliff Adkins, Systems Programmer, Appleton Papers

Putting Technology to Work: Appleton Papers

When Appleton Papers decided to implement its first SAN environment last year, it had a number of tough criteria to meet. Most important, the system had to have virtually zero downtime, since Appleton is a global business with substantial e-commerce dealings. But other key decision factors were scalability, centralized management, and price performance.

The Need for SAN

Appleton Papers is the world's largest producer of the carbonless paper used in multipart business forms. The company is also the premiere producer of direct thermal papers used in point-of-sale, tag, ticket and label applications. Appleton Papers operates two paper mills, two converting plants, and eight distribution centers across North America. Appleton's parent company is based in Paris.

To support these far-flung operations, Appleton has an IBM mainframe with two Hitachi Freedom Storage 7700E systems connected directly to it, containing about 1.5 Terabytes of storage. One 7700E runs the workload of its parent company's European division as well as Appleton's new storage area network (SAN) environment. The other is exclusively devoted to mainframe business (financial accounting and enterprise resource planning).

When it first implemented its Web environment, Appleton used Windows NT servers with local storage. But the company was seeing costs ratchet up with independent storage on every server. On top of that, growth was so rapid that scalability and 24/7 access were concerns. According to Bert Wiegand, Appleton's Director of Computer Operations and Technical Support, "We needed a sharable resource for our Web servers, our decision-support applications, and other distributed applications. We also saw the need to have an environment that would improve our productivity through centralized management."

The solution was an Hitachi Freedom SAN. While Appleton has worked with Hitachi Data Systems since 1988, it looked at a number of vendors for the SAN project. Wiegand says, "Hitachi's price for performance was very attractive and we saw their SAN technology as being mature. It offered us an attractive investment with a high confidence of success due to our past relationship with Hitachi Data Systems and the quality of their people."

Appleton Systems Programmer Cliff Adkins adds, "Hitachi's 7700E and Lightning 9900 series offer a guarantee of accessibility or availability that is unique in the industry."

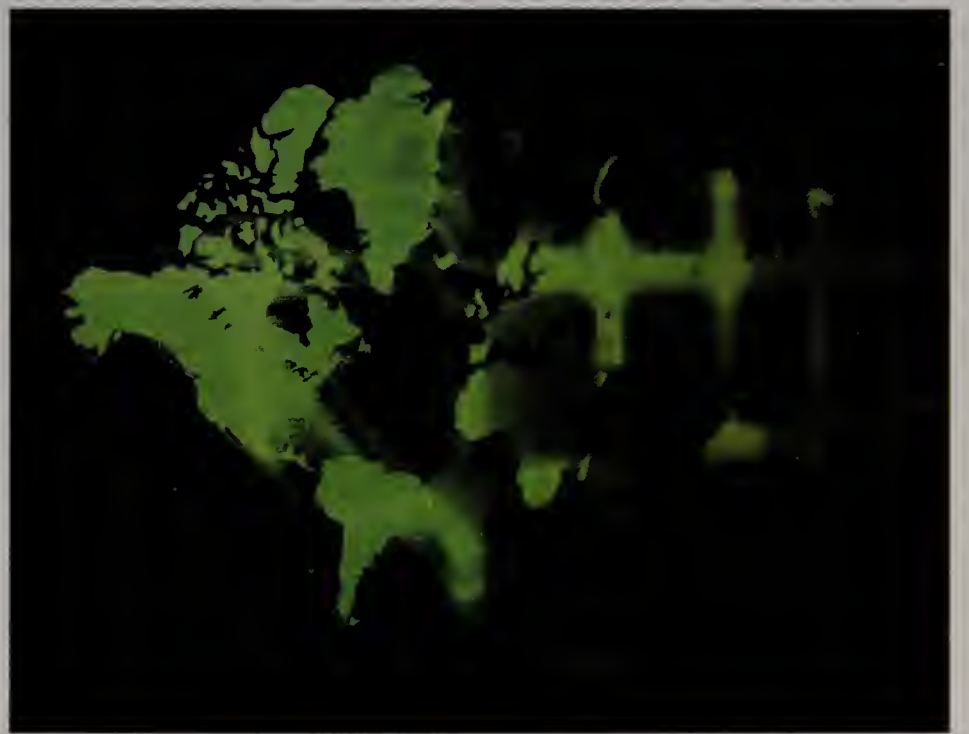
The Implementation

Now that Appleton's SAN is up and running, with about 13 Compaq Proliant servers devoted to e-business, Appleton is in the process of migrating two large client/server applications to the system: e-messaging (Microsoft Outlook and Exchange), as well as local area network file and print storage. They also

have two large data-warehousing applications, containing historical financial and manufacturing data, and targeted to migrate to SAN storage this year. All told, Appleton expects SAN storage alone to grow from 660GB to 1.1 terabytes in 2001.

Return on Investment

While scalability, availability and ease of management were key factors in Appleton's decision to go with an Hitachi Freedom SAN, the company is also realizing significant returns on investment. According to Adkins, "With the ability to easily and quickly expand the amount of storage in the SAN pool, we can reallocate and redistribute storage for a given application. For instance, we have a data warehouse application with a rapidly growing need for storage. We can easily allocate space as needs change without having to go out and purchase multiple stand-alone drives."



Personnel costs are also kept in line, even in the face of rapidly expanding IT needs. Appleton Telecommunications Manager Mark Kools has found that "we can do more with the human resources we have because of the reduced management requirements compared to local storage."

The bottom line for Appleton is that Hitachi Freedom SAN technology was able to meet its needs for round-the-clock availability, rapid capacity growth, performance and ease of administration, while holding down costs. As Wiegand says, "Over the years, we considered other vendors for storage expansion, but we always migrated back to Hitachi Data Systems." ⚡

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However, if a firm locks in to a particular technology or vendor or business model (such as an SSP), the likelihood is that the infrastructure will become limited in some way in the future, preventing the firm from leveraging all the value that resides in its stores of data.

Managing Centralized Storage: The Team Approach

While centralized storage opens up whole new ways to mine customer data and share information across departments, it also involves a sea change in the way IT departments manage that data.

A key lesson Hitachi Data Systems has learned from implementing SANs is that the most successful implementations

involve one group giving up their loyalties to a particular product, application, or operating system and banding together with other groups to form a storage team. "Ideally, what you need is a department of storage rather than these little fiefdoms," McNicoll says. "That way you come from an open-minded approach and set up an objective group to deal with the problem. You can't come from a particular philosophy, such as saying everything must be centralized, because then you are imposing disciplines right off the bat that might not work for the particular situation."

Enterprise storage requires firms to look outside individual business units and include such departments as corporate risk analysis, auditing, purchasing, and facilities in the planning process. After all, eventually all this storage will have to be connected, and that will bring up right-of-way issues that the facilities department will have to determine. An enterprise storage system also brings up new issues that technical people might not consider. For example, if the company uses fixed wireless to communicate between sites, is there a nearby airport that might cause interference issues?

The bottom line is that CIOs need to be prepared with an enterprise infrastruc-

ture that is flexible and open enough to go wherever users need, and that has the carrier-class attributes required for the new

information economy: always on, cost-effective, secure, scalable, and flexible. ⚡

What CIOs Need

"CIOs need to build an infrastructure to meet the performance requirements of today's business marketplace, where every e-click creates new data," points out Hitachi Data Systems' Hu Yoshida. To meet business needs and remain cost-effective, storage solutions must be:

- **Always available.** If a company's stored data becomes inaccessible to users and customers, business ceases. Lost revenues are bad enough, but it rarely stops there. Frustrated customers may never return, spreading word of their disappointment as they retreat. Stock prices can be negatively affected. Productivity plummets. And resources must be devoted to remedies that help rebuild good will.
- **Massively scalable.** A single TV ad can produce thousands of online orders in minutes. Even more modest marketing campaigns can generate huge amounts of customer interaction data. Much of this data must be stored, which means IT managers need substantial amounts of additional storage and server resources that can be brought online almost instantly without compromising performance or reliability.
- **Easy to manage.** The costs of IT infrastructure quickly get out of hand if administrators can't easily and efficiently monitor network and system performance, understand requirements, and allocate resources accordingly—regardless of where devices are physically located.
- **Open and interoperable.** Historically, storage products and the tools and procedures for managing them have been vendor- and product-specific. While storage standards are being worked on, they are still evolving, and organizations can't assume that storage devices are interoperable with the rest of their IT infrastructure. So CIOs must stay vigilant about the openness and interoperability of the storage devices they acquire.



Hitachi Freedom Storage
Thunder 9200

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"We have Microsoft Windows NT servers, usually Compaq on the UNIX side. For routers, it's Cisco. And for storage, it's Hitachi Data Systems."

— Peter Cederqvist, IT Leader at Nocom.net



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Information Means The World.

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Storage Area Networks: Past, Present, and Future

Information is at the core of e-business, and intelligent information infrastructures empower customers to maximize the business value of that data. Today's competitive edge is the ability to turn data into information that can be acted on quickly, enabling faster decision making, quicker time to market, and operation at Internet speed.

Hitachi Data Systems solutions are the foundation of this intelligent information infrastructure. The Hitachi Freedom Storage Lightning 9900 and Thunder 9200 systems are complemented by sophisticated software for managing and protecting information, and by deployment architectures, such as SAN and NAS, that provide nearly unlimited storage pools to be shared across the enterprise.

What Is a SAN?

A SAN is a scalable network based on Fibre Channel protocols that support high-speed data transfers between all parts of a system: server-to-storage, storage-to-storage, and server-to-server. In a SAN, the high-speed networking allows storage to be shared and pooled, rather than attached directly to each server. SANs provide a host of benefits, including better resource utilization through centralized management, improved performance, better security, and higher availability.

According to IDC and other research firms, more than half of all the space on direct-attached storage isn't used. Pooling resources so other servers can access this unused disk space can unearth large savings. E-business, which needs the performance that only multiple high-performance processors can bring, can achieve this only by letting those servers access large pools of data.



SANs Are Working Now

Some people still talk about SANs as if they were a future technology, but even as next-generation SAN designs are being explored, many companies are enjoying a competitive advantage from the technology. "People are still saying SANs are not real and are taking too long

to get on board," says Hu Yoshida, Vice President and Chief Technology Officer at Hitachi Data Systems.

Part of the reason for this misperception is most of the initial forays into SANs were not designed to meet companies' long-term strategic needs. Initially, most vendors promoted

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the
Scales

SANs provide a host of benefits, including better resource utilization, improved performance, better security, centralized management, and higher availability.

**"Hitachi's switched-network SAN architecture
will allow users to scale to much higher data capacity while continuing
to meet performance requirements."**

— John McArthur, vice president of storage research at IDC

SANs based on Fibre Channel Arbitrated Loop (FC-AL) technology with low-cost Fibre Channel hubs. While this seemed economical, it proved costly over the long run when the networks couldn't scale. FC-AL loops increased data transfer speeds to 100MBps and increased connectivity, but like the SCSI buses they replaced, the FC-AL technology could not scale to meet users needs.

Although more devices could be connected to a server in an FC-AL loop, only one conversation could occur at any point in time. Devices and servers had to be "arbitrated" for the use of the loop, and as more devices were connected, the arbitration workload increased and throughput decreased. When any changes were made to the loop configuration, such as adding or deleting devices, the entire loop would be re-initialized, causing work in process to be reset.

Many early SAN users started with FC-AL architecture because it was cheaper and easier to implement than Fibre Channel switched fabrics. Unfortunately, that choice often turned out to be shortsighted. Most of the horror stories about SAN came about because of early implementations of SANs with FC-AL.

Hitachi Data Systems was one of the first firms to install large, scalable switched-fabric SANs for its customers. Unlike the FC-AL loops, Fibre Channel switch technology enables multiple nonblocking 100MBps path connections between elements in the SAN. Multiple conversations can occur simultaneously at full Fibre Channel speed. As more ports are added to a switch, throughput increases rather than decreases. Fibre Channel switches also support a name table that enables devices to be added or deleted from the switch without a disruptive reset of the other ports on the switch.

SANs: The Next Generation

The demands of e-commerce in particular have accelerated the acceptance of switch-based fabric SANs over lower-cost SCSI and FC-AL forms of connectivity. Although SAN switches are more costly, they provide the scalable performance and connectivity required in the high-performance, always-on, world of e-commerce.

However, switches introduce a higher

demand on the storage system by increasing the number of servers attached to each storage port. Traditional storage systems were designed when the world expected only one server to be attached to one storage port. With switched fabrics, many more servers now have access to each storage port. The performance bottleneck that was relieved by the Fibre Channel switch was now transferred to the controller of the storage system. Hitachi Data Systems has introduced a new paradigm for storage systems that overcomes e-commerce bottlenecks with scalable fabric SANs.

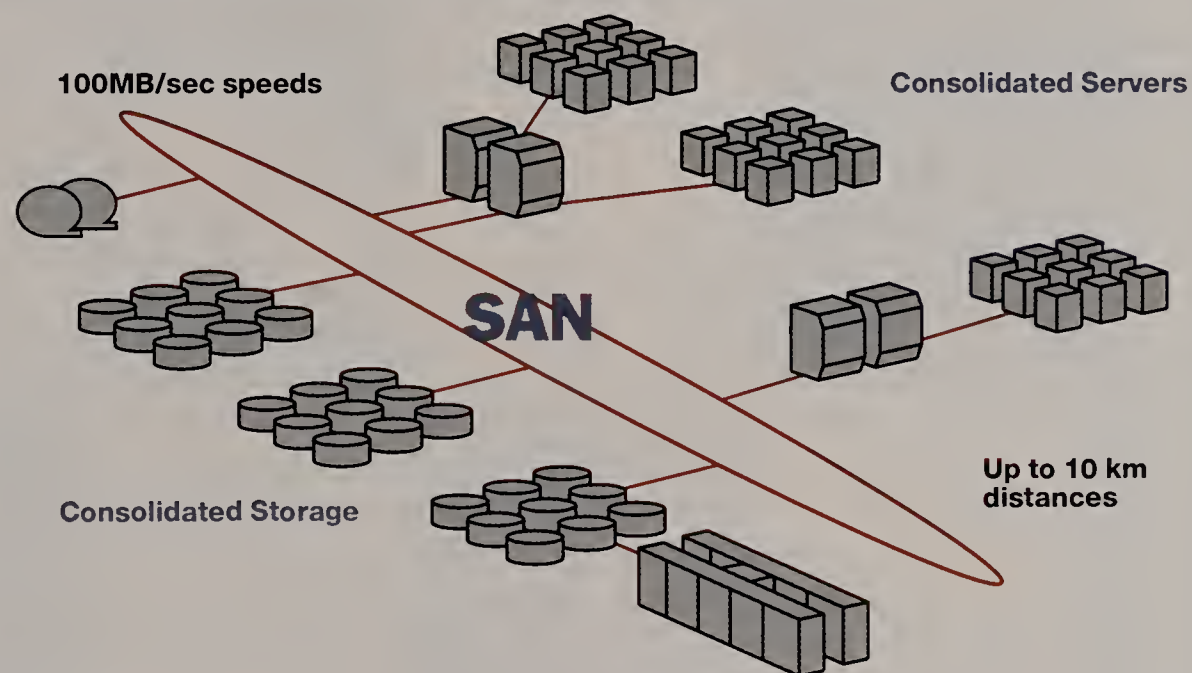
This architecture provides 6 to 10 times the performance of traditional networks.

Hitachi's Industry-First Storage System for SAN Architectures

Hitachi has developed the industry's first storage system featuring an internal switch-network architecture. Hitachi Freedom Storage Lightning 9900, the backbone of this new paradigm, is founded on the Hitachi Hi-Star architecture, which provides multiple, redundant, nonblocking paths between the storage ports, multiple

Storage Area Network—SAN

A SAN is a high-speed Fibre Channel network that consolidates storage and server resources for scalability and ease of administration. All resources on the SAN can communicate with each other at Fibre speeds, even if they are also connected via a traditional LAN.



This new paradigm was developed after studying the parallels between the historic growth of the telecom industry and the emerging e-business industry. Telecom and e-business share numerous characteristics, including the need for rapid growth management and the provision of fast, continuous service. Both telecom and e-business use switches to enable connectivity.

The new storage model passes data through a switching network internal to the storage system, as well as through externally attached switching fabrics such as storage area networks.

cache nodes, and multiple disk Array Control Processors. The system scales up to a total internal bandwidth of 6.4Gbps, providing six to eight times the internal bandwidth of the shared bus-based storage systems. The Hi-Star architecture provides the cache performance and capacity that is demanded in the e-business world, where many more users are accessing larger amounts of data.

Analysts are already praising the concept. "We believe that Hitachi can integrate the Lightning 9900 into its Freedom Data Networking Architecture to pioneer the Fibre

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Channel-based storage area network as the platform of choice for high-performance Internet computing environments," said Steve Denegri, First Vice President, Storage Networking Research at Morgan Keegan.

This new design allows e-commerce firms to handle giant peaks in website activity. They will be able to add new capacities and features without disrupting their applications. Leveraging the Hitachi Freedom Storage Management suite of sophisticated software products, data backups can be done in the ever-shrinking windows of time available for this purpose. And should an application failure or disaster occur, data can be recovered quickly enough for the business to keep moving forward.

Extending SAN Capabilities: The GeoSAN Network

"The incredible expansion of network-based data is driving businesses to seek creative ways to store it," says John McArthur, Vice President of Storage Research at IDC. "Hitachi's switched-network SAN architecture will allow users to scale to much higher data capacity while continuing to meet performance requirements."

This new architecture goes hand-in-hand with an ongoing redefinition of what SANs can be. SANs, in Hitachi's view, are not just an extension of the LAN, but can expand to even broad-area in the enterprise. "Enterprise business solutions require the optimum combination of networking technologies, including SANs, LANs, and WANs [wide-area networks]," Yoshida said. "SANs are only part of a larger network paradigm Hitachi calls the Freedom Data Network. This combines the benefits of server and storage networks. The networking of data is our focus and not the data containers or protocols. SANs are primarily based on Fibre Channel today, tomorrow it may be block-level IP."

Today WANs are built on IP protocols and are used primarily for backup. Fibre Channel can provide extensions beyond 10 kilometers without the need to use IP with today's TCP overhead. This new concept is termed a SWAN, adding an "S" to designate storage.

Rethinking a SAN in this way provides multiple benefits above current implementations. A

SWAN, called a GeoSAN Network by Hitachi Data Systems, promises to do remote mirroring or backup for disaster recovery much more quickly and efficiently than traditional network approaches allow. Backup and remote mirroring over 100MBps Fibre is much more efficient than over 100BaseT Ethernet. More important, 100MBps Fibre allows recovery to be much faster — a crucial point in an era when downtime is counted in seconds, not days or hours.

GeoSAN Networks Provide Global Reach for Businesses

While cost savings and disaster insurance are the most obvious benefits of a GeoSAN Network, this new concept also epitomizes the way companies are looking to tap in to their storage to create opportunities and generate revenues. By providing global reach and content delivery over a widely dispersed network, a GeoSAN Network can allow a host of different types of firms to offer storage-on-demand from an offsite or colocated facility. Storage Service Providers (SSPs), Host Service Providers, carriers, and utilities — indeed, anyone who has control or access to broadband backbones — could provide this type of service over a GeoSAN Network.

This gives the end user more flexible service options, while offloading the capital expense of implementing a storage network. GeoSAN Networks are also appealing to geographically dispersed enterprises that pool storage resources across several remote locations. Such an enterprise (or an SSP), can now face dire consequences when running out of physical floor space at a collocation facility if users need additional storage. A GeoSAN Network allows these firms to connect to other locations nondisruptively, providing end-users with a "virtual" storage point of presence.

Setting Up a GeoSAN Network

Implementing a GeoSAN Network, of course, is much more challenging than defining it. The difficulty is that storage is tied to mechanical devices that need strict, synchronous timing windows. These mechanical devices seek, spin, search, and stream — they need a closed, predictable network.

Fibre Channel can handle this task for a

metro-sized area of up to 100 kilometers or so. "You fill the pipes between the center with buffers and you get near equal performance across metro types of distances," Yoshida says. "You couldn't do that with SCSI, because it doesn't have the ability to fill the pipes with buffers."

However, Fibre Channel doesn't work well over wide-area networks, because performance degrades. "You can only extend Fibre so far before the eye pattern is lost," Yoshida explains. "To get to the wide area, you need to go to IP. This is what is promoting all the interest in iSCSI (SCSI over IP), SoIP (storage over IP), and FC-IP (Fibre Channel over IP), which help get data to IP pipes so it can be sent over distances beyond 100 kilometers."

Currently, IP requires large software overhead to control transmissions, handle collisions, and perform retries over the public network. Once these problems are solved and standards settled, GeoSAN Networks will become an integral part of enterprise storage strategies. But companies who don't look at what SANs can do now may be missing significant opportunities. ⚡

Key Benefits of Hitachi's Freedom SAN:

- Consolidation of server and storage resources
- Data sharing among heterogeneous hosts
- Centralized resource and data management reduces TCO
- Superior data security
- Server/storage system scalability improves ROI
- Improved information access
- Enhanced application/backup performance
- Increased resource manageability and reliability
- Higher availability, fault-tolerant operation
- Increased connectivity
- A switched storage architecture to match the demands of a switch-based SAN

Tipping
the
Scales

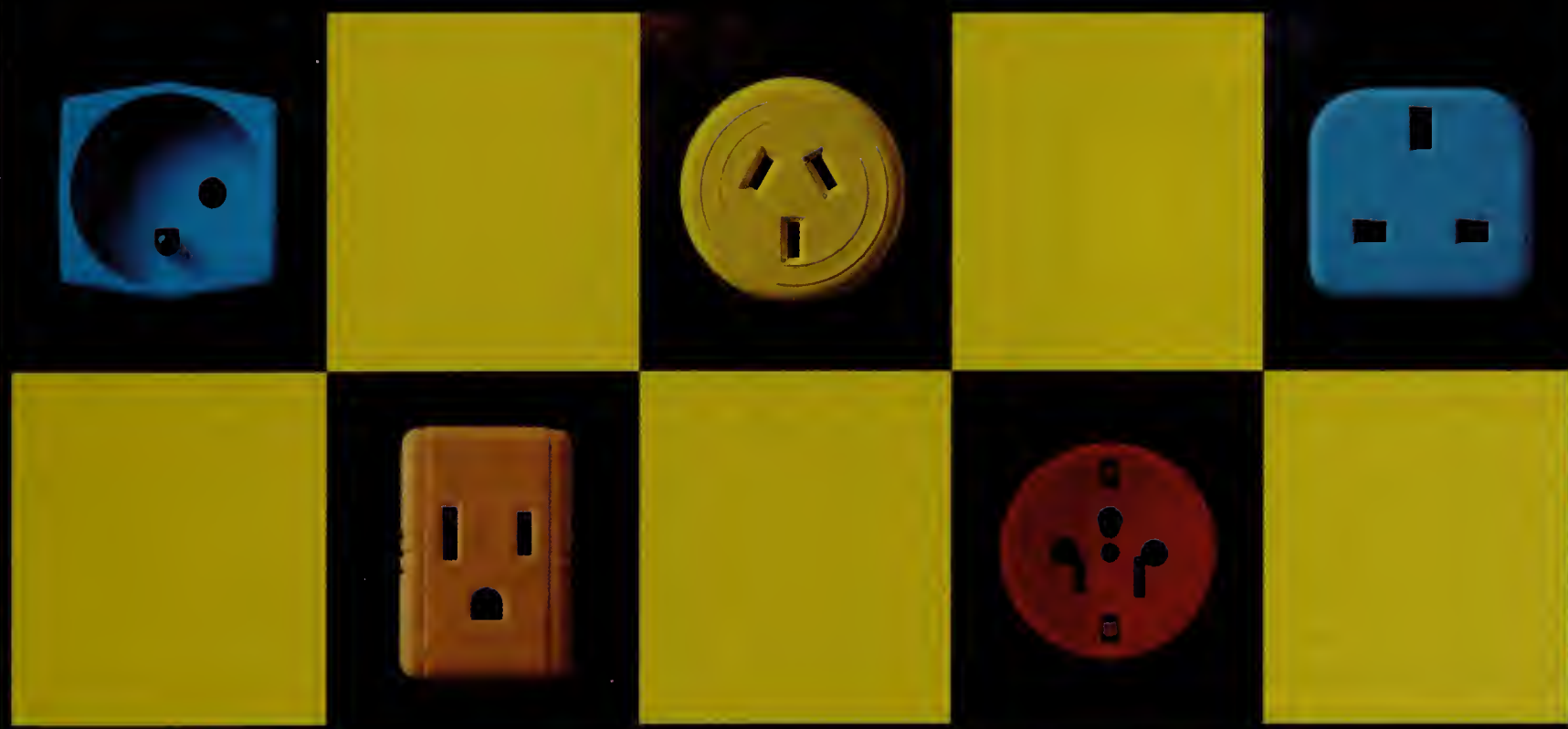
GeoSAN Networks are appealing to geographically dispersed enterprises that want to pool storage resources across several remote locations.



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Balancing Act: Meeting the Demands of the Global Information Economy

Flick the Switch with Just In Time Storage

In the demanding e-business world, CIOs are required to deliver an always-available environment that operates at peak efficiency. That is easier said than done when storage demand is unpredictable. High-growth organizations must battle raging demand, seasonal spikes, and costly service interruptions, while at the same time trying to maintain the right balance between capacity and performance.

This is a tricky and pricey balancing act. Day-to-day administration of all this storage demand is time-consuming and costly, draining already-scarce IT resources. No wonder analysts estimate that in three years, companies spend seven to 10 times more to manage their storage than it cost to purchase their storage systems in the first place.

Numbers like these are causing more companies to reevaluate the way they have historically bought and allocated storage. Old paradigms don't work in a new storage world, where data-intensive applications are doubling storage needs annually.

A new concept called Just In Time Storage — that looks to simplify the management tasks faced by large enterprises and storage service providers (SSPs) — has drawn enthusiastic praise from analysts. Just In Time Storage, introduced in December 2000 by Hitachi Data Systems, is the first large-scale storage-on-demand solution that is operating-system independent and allows customers to increase capacity, cache, and host connections instantaneously with a mouse click.



Pay as You Grow

Through a combination of hardware, software and services, Just In Time Storage eases the burden of upfront storage acquisition costs, allocation, and day-to-day administration. Instead,

a managed-service level agreement offers monthly “pay-as-you-go” billing.

In the past, the idea of storage-on-demand has primarily been advocated as a financial concept. The new model goes far beyond that, providing a

Tipping
the
Scales

Analysts estimate that over three years, companies spend 7 to 10 times more to manage their storage than it cost to purchase their storage systems in the first place.

With the pay-as-you-grow model, and instant access to additional capacity, storage becomes a utility.

storage management solution that delivers capacity immediately to the user at the mere touch of a keystroke — no vendor intervention is required at the time of the upgrade.

"This is considerably more than just a plan for financing storage acquisition," says Jack Scott, Managing Partner at the Evaluator Group, a storage analysis and consulting firm in Denver Col. "Hitachi Data Systems is looking to make it easy for users to manage their storage capacity and performance. The plan should appeal to many users who are trying to cope with the problems of rapid expansion."

Rather than locking a company into a preset acquisition plan, Just In Time Storage is customized to individual requirements. At the start of the "Just In Time" process, Hitachi Data Systems storage professionals host a workshop or work one on one to determine a company's base requirements and expected storage growth, including determination of RAID configurations, cache, and host connections required in the base configuration.

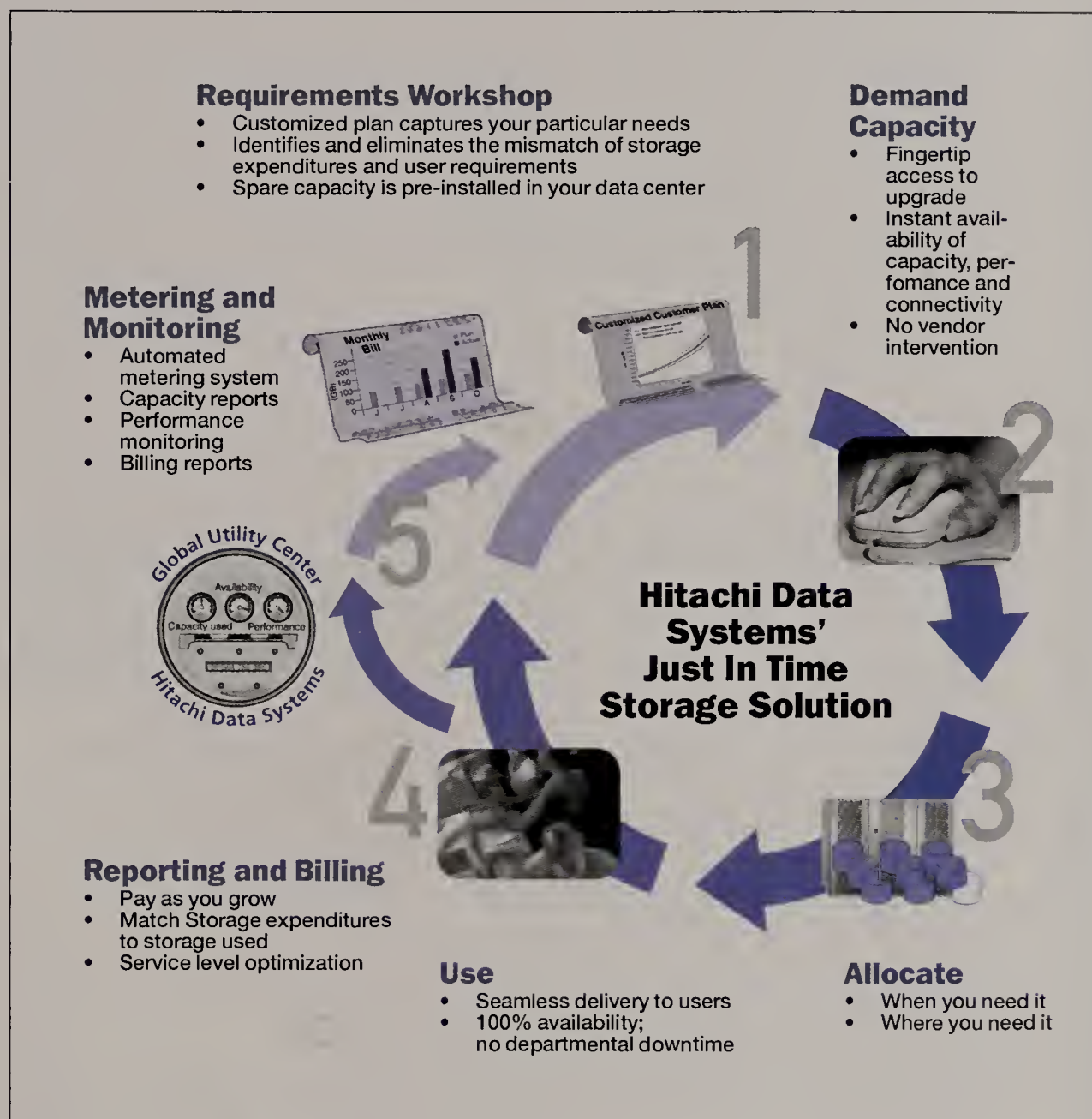
This process analyzes the operational requirements of the company's unique needs, considering new applications, new technologies, performance issues, and its business environment. The storage growth curve is developed system-by-system, an old idea in the mainframe world that is just now being imported into open systems.

"In the OS/390 world, IT people pretty much had storage planning down," says Roger Marvinney, Managing Director of Storage Utility for Hitachi Data Systems. "In the open-systems world, however, planning is less disciplined so we give them a process."

Passive Monitoring Ensures Capacity Is There When Needed

Given the new demands on enterprise storage, even thorough planning can accomplish its task only if it has complete flexibility. Just In Time Storage, then, hinges on a new passive metering capability that constantly monitors every system, providing the exact capacity of cache, RAID groups, and host connections.

The Hitachi Data Systems Global Utility Centers in San Diego, Calif. and the United Kingdom constantly monitor actual growth on a daily basis, determining if there are any discrepan-



cies from the original plan. This allows Hitachi Data Systems to monitor service-level agreements for storage users, document a monthly report of system activity, and provide the end user with a reconciliation of their own billing systems.

User-Upgradeable at the Click of a Mouse

The goal of Just In Time Storage is to empower customers to self-upgrade capacity and performance, including cache, RAID group capacity, and host connections. Just In Time Storage leverages the built-in intelligence of the Hitachi Data Systems Freedom Storage systems at a company's data center, providing instant fingertip access to capacity and cache.

"We designed a system that allows our customers to upgrade storage anywhere within their

storage management networks at the click of a mouse," Marvinney says. "You could be in a control center in Atlanta, Georgia, and upgrade your Hitachi storage in a lights-out facility in the United Kingdom. No other vendor can do this."

This kind of control is essential, Marvinney notes, in an e-business environment that might require a firm to upgrade at 2 a.m. — or risk disappointing or losing customers. "The storage industry, by and large, has not come to grips with these new user demands for instant storage," Marvinney says. "By contrast, EMC requires you to give them 24 hours notice and to quiesce the system during an upgrade. We are also the only storage vendor that can deinstall unused capacity on the fly and move that capacity to another enterprise system without interruption. This can help achieve more cost-effective utilization rates for our customers."

Balancing Act: Meeting the Demands of the Global Information Economy

Painless Capacity Optimization

The ramifications of this new system can be felt up and down the storage chain. Consider companies that deal with users who need small amounts of additional storage on a constant basis. Historically, storage administrators have had to analyze the system, find unused capacity, and relocate and readdress that unused capacity. This time-consuming process is a constant ebb and flow at many companies as they try to meet the fluid user demands with a fixed availability of storage.

In this current age of unpredictable storage needs, the ultimate goal for enterprises is storage transparency. End users demand and expect storage to be available when it is needed. "Hitachi Data Systems' Just In Time Storage offering moves the enterprise closer to that objective by removing most of the procurement tactics required to keep up with unpredictable storage growth," says Mike Kahn, an analyst with the Clipper Group, a consulting firm in Wellesley, Mass. "It allows the increments to be optimized to meet application requirements and provides an alternative pay-as-you-go financing plan, which will be attractive to many fast-growing companies."

This appeals to several constituencies: large companies that warehouse massive amounts of data and want to simplify data storage and management; e-businesses with data centers with unpredictable growth; and, of course, SSPs or other outsourcing providers that centrally manage data for other companies.

Treating Storage Like a Utility

With the pay-as-you-grow model, and instant access to additional capacity, storage becomes a utility, just like natural gas or electricity. "Hitachi Data Systems' high-end customer can use it to smooth out their acquisition costs as well as to simplify the storage-management process," says Doug Chandler, Program Manager for Storage and Data Management Services at the International Data Corp., a consulting firm in Framingham, Mass. "For SSPs, the ability to pay for the storage in time with the payments they are receiving from their

own clients is a clear benefit."

Indeed, the Just In Time Storage model is being propelled by SSPs, including large firms that want to develop their own storage-centric network and act as an SSP for their own employees. "Most companies do not want to build points of presence around the United States, which is what you need to do to become a storage utility, as defined by most analysts today," Marvinney says. "Most of our customers in the Fortune 250 do not want to outsource their storage at this time. Our Just In Time Storage solution allows those companies to have our equipment on site but act as their own utility."

The Just In Time Storage model generally adds 15 percent to the cost of straight storage. That amount is quickly recouped, though, since the system eliminates up-front capital expenditures, reconciles billing to user levels, and can reduce day-to-day storage acquisition and capacity administration costs by as much as 50 percent.

Operating System Independence

The flexibility of Hitachi Data Systems' Just In Time Storage model extends to its embrace of multiple operating systems. Just In Time Storage is operating system independent. It can be used without modification in all major computing environments, including Windows NT/2000, OS/390, and a variety of UNIX-based operating systems, such as Linux.

The minimum initial base configuration for an Hitachi Freedom Storage Lightning 9900 system is 2 terabytes of base storage, annual growth expectations of 50 percent plus, and utility monitoring software with a dedicated RJ-11 analog line.

No Downtime, Ever

Hitachi Data Systems' Just In Time Storage is the only solution offering up to 37 terabytes of raw storage in one system with a 100-percent availability guarantee. The service offers everything from basic capacity to a full range of storage management software and services, including disaster recovery and business continuity.

Users can also tune performance of storage sys-

tems by increasing the amount of cache memory and the number of paths connecting the storage controller to the hosts, maintaining data availability and zero-service disruption. Performance is further enhanced because Just In Time Storage leverages the Lightning 9900 enterprise storage system, with its Hi-Star architecture designed to sustain high performance.

In Marvinney's view, a key to understanding the economic benefits of the program is for users to more closely analyze the costs of their current Storage On Demand arrangements. "In most storage plans, vendors have already extracted their pound of flesh from the customer to subsidize the demandable capacity of the box," Marvinney says.

But no matter how you look at it, most firms are grappling with rapid growth, unpredictable demand, and spiraling management costs. And what could be an easier way to deal with all this than simply clicking a mouse to have all the storage you need delivered right away? ⚡

Benefits of Hitachi Data Systems' Just In Time Storage Solution:

- Eliminates up-front capital expenditures — "pay as you grow"
- Matches storage expenditures to storage used
- Reduces day-to-day storage acquisition and capacity administration costs as much as 50 percent
- Improves asset-management capabilities
- Lets customers roll out new applications quickly
- Fits every environment—Microsoft Windows NT/2000, UNIX, Linux, and OS/390
- Allows customers to focus on business, not storage needs

Tipping
the
Scales

Hitachi's Just In Time Storage is the only solution offering up to 37 Terabytes of raw storage in one system with 100 percent availability and no downtime.

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USER RELATIONS

More Than a Game

By Stephanie Overby



THE BRUINS AND Celtics will not enjoy extended playoff seasons this year, but Boston sports buffs still have something to cheer about. The FleetCenter is championing the high-tech sports experience with new, interactive

computer stations.

The arena installed SmartSeat interactive technology stations from New York City-based ChoiceSeat in each of its 108 suites. Users can request live-action shots and replays from different angles, up-to-

the-second scores and stats, player profiles, rule books and more via a 15-inch flat panel monitor with touch-screen technology. Ticket-holders may be able to order that Sam Adams or a few more dogs without leaving the plate-glass view next season. Fans not lucky or loaded enough to land suite seats (sold in five- and 10-year terms at \$175,000 to \$220,000 per year) can find 45 other stations in "Compaq Zones" near concessions.

Also used at New York City's Madison Square Garden and Tropicana Field in St. Petersburg, Fla., the stations give fans the best of both worlds—the information flow usually only enjoyed from a La-Z-Boy location and the excitement of a live game.

But management doesn't expect SmartSeat technology alone to attract crowds. "It's unrealistic to think that any single amenity added to the sporting experience is going to draw fans in droves," says Rich Krezwick, president and CEO of the FleetCenter and executive vice president of the Bruins. "It's the entire game experience that makes live sports a passionate draw."

The FleetCenter may extend the SmartSeat technology to other events (think Britney Spears from all angles) or even take it wireless. There's still one problem the new technology doesn't solve yet—bathroom trips. Can SmartSeats in bathroom stalls be far away?

I.T. TRAINING

Cruisin'

IT MAY NOT be the Love Boat, or even the love-bug virus boat, but Geek Cruises, a Palo Alto, Calif.-based conference sponsor, has created a "floating conference," another in a long line of odd corporate incentive programs to hit the high-tech world. Using Holland America cruise ships, the company books and sponsors events such as its first success, "Java Jam," that incorporate the educational aspects of a conference with the fun of life aboard a cruise ship.

Jim Goodman, fellow engineer at Los Angeles-based Northrop Grumman Corp., won a company contest to get on the cruise. Grumman's challenge was for employees who didn't know Java to write an essay on how learning the program would enable them to do something effective for their department. Goodman had a Geographic Information Systems (GIS) product that required Java programming in order to be used to its fullest capacity.

For seven nights, he was one of approximately 1,500 passengers onboard, along with about 150 other "geek" participants. Goodman admits that he thought the education might be less intensive on a ship, especially when he saw a schedule that looked like he'd be in class only four to six hours every other day instead of the typical eight hours daily. "What surprised me



is I learned a great deal more than I thought I would at the time. It was exhausting, but the cruise was good recovery," he says.

Both Geek Cruises and Goodman emphasize the enhanced social aspect of the cruise course. "I'm not really a social animal," Goodman admits.

—Stephanie Viscasillas

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Off the Shelf

Edited by Carol Zarrow

Misplaced Key

Managing Strategic Relationships: The Key to Business Success

By Leonard Greenhalgh

The Free Press, 2001, \$30

Leonard Greenhalgh's academic background shines through in *Managing Strategic Relationships*: It reads like a freshman textbook. Despite having been written by a management consultant who has founded and run two companies, the

book is decidedly lacking in real-life anecdotes. Instead, page after page is filled with scenarios beginning, "Joe and Josephine are twins"; dialogs between a fictitious husband and wife; and diagrams such as The Fractionated Organization (a triangle broken into, you guessed it, fractions).

Greenhalgh also slips in a few company case studies and complex graphs. The studies, unfortunately, are shallow and the graphs lack practical value. Readers may fail to see how a statistical map featuring an imaginary landlord and vacationer will ultimately assist them in implementing new business strategies.

That's not to say there isn't merit to the book. Like a set of Cliffs Notes, it broadly covers workplace sociology, makes valid points about interpersonal and corporate relationships, discusses some sticky situations, and offers a base for further investigation. Just don't expect to pass any tests with it.

—Amanda S. Fox

And...

What Do I Do Now?

Dr. Foster's 30

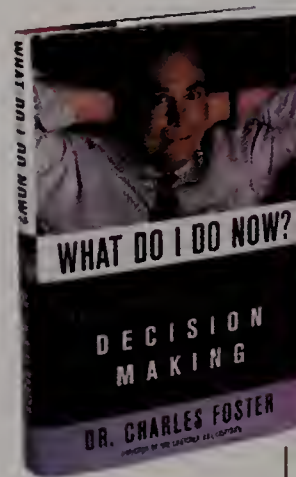
Laws of Great Decision Making

By Charles Foster

Simon & Schuster, 2001, \$24

Clinician and researcher Charles Foster has a serious goal—to demystify decision making and reassure readers that they can trust themselves to make sound choices. *What Do I Do Now?* is not a business book, and it is more enjoyable to read than it has any right to be. Its subtitle, however, might prompt cynics to decide that it's all Letterman and no substance. And that would be the wrong decision.

—Carol Zarrow



CIO Best-Seller List

5.

First, Break All the Rules: What the World's Greatest Managers Do Differently

by Marcus Buckingham and Curt Coffman

Simon & Schuster, 1999

4.

Now, Discover Your Strengths: The Revolutionary Program That Shows You How to Develop Your Unique Talents and Strengths—And Those of the People You Manage

by Marcus Buckingham and Donald O. Clifton

The Free Press, 2001

3.

Fish! A Remarkable Way to Boost Morale and Improve Results

by Stephen C. Lundin, Harry Paul and John Christensen

Hyperion, 2000

2.

Longaberger:

An American Success Story by Dave Longaberger

HarperCollins Publishers, 2001

1.

Who Moved My Cheese? An Amazing Way to Deal with Change in Your Work and in Your Life

by Spencer Johnson

The Putnam Publishing Group, 1998

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What They're Reading

Michelle Brown, freelance Web producer, Los Angeles Joanne Eglash, *How to Write a .com Business Plan: The Internet Entrepreneur's Guide to Everything You Need to Know About Business Plans and Financing Options* (McGraw-Hill, 2000) "I needed a book that combined sensible business plan information with an Internet slant, and this book is exactly what I wanted."

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Know Thyself

BEFORE YOU BEGIN planning Web-based applications, answer the following questions:

1. Who is your audience?

You can make assumptions and demands of employees and distributors, for example, that you could never make with customers.

2. What is your audience's bandwidth?

Don't dumb-down applications to accommodate a small percentage of low-bandwidth users. Instead, rely on caching methodologies that will yield a robust application that can be deployed to low-bandwidth clients and accessed directly by higher-bandwidth users.

3. What type of application are you building?

HTML is highly capable of delivering relatively static content with minor user interaction but not so good for sophisticated business applications.

4. Are you replacing an existing system?

Users will expect more and better functionality and performance.

5. How much data is involved?

Using an intelligent client approach enables data to be compressed at the server and decompressed at the client. This can reduce response time by up to 95 percent for large queries.

6. How much interactivity is involved?

For application navigation and simple forms, HTML is a good choice. To enter or analyze data, an intelligent client is required.

7. What are your overall response-time requirements?

Prototype solutions for functions that may exhibit poor response.

8. What are your printing requirements?

For robust printing, employ a printing framework that allows functions to render themselves as printable with minimal coding.

9. Do you control the client?

To accommodate many operating systems, browsers and connection bandwidths, you may have to use an HTML user interface. If you have more control of these elements, you'll have more choices.

10. Does the processing or data to be used in the application already exist in the enterprise?

People creating Web apps are often outside IT and aren't aware of existing data and software assets, or view them as inaccessible. Redundant databases are created and duplicate codes are written to support the Web initiative—a maintenance and data integrity nightmare.

SOURCE: DONALD BERMAN, PRESIDENT, CS STRATEGIES



WIRELESS

Liver Longer

YOU OFTEN HEAR dedicated users of wireless handhelds exclaim, "I can't lose that, my life is in there!" Now, there's even more truth to that.

Last June, Vitagen, a La Jolla, Calif.-based biotechnology company, began using wireless devices to manage randomization for a series of clinical trials for an artificial liver system called the Extracorporeal Liver Assist Device (ELAD). The ELAD contains live human liver cells and can support a patient's liver functions for up to 10 days, by which time hopefully he will have had the needed transplant. Vitagen's clinical trials were in high demand, and doctors needed to know which patients involved in the trials were receiving the ELAD treatment and which were in a control group. Using a software program developed by Synteract, a contract research organization in Encinitas, Calif., and the SAS Institute in Cary, N.C., doctors were able to access randomization codes (tracking which patients are treated with the new device and which with standard treatment) via handheld devices over a wireless connection, saving vital time.

Before the applications were developed, doctors used phone, fax or e-mail to access up-to-date information, which was maintained by Synteract. Now, instead of lugging laptops from room to room, doctors can do their job anywhere as long as they have a Palm VII with them.

"The patients we work with are critically ill," said Patrick Maguire, Vitagen's vice president of medical affairs and technology development. "It is absolutely mandatory that we get the right information to the right people at the right time."

—Simone Kaplan

"In the new millennium, we will become our machines. We're going to put technologies in our bodies faster than we build man-made machines. We will not be the same species anymore."

—Rodney Brooks, director, MIT Artificial Intelligence Lab



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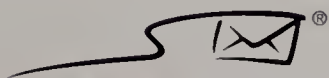


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Get Real with John Sviokla

Creating Value in the New Economy

Being There

How to be a 24-hour, 3-D marketer

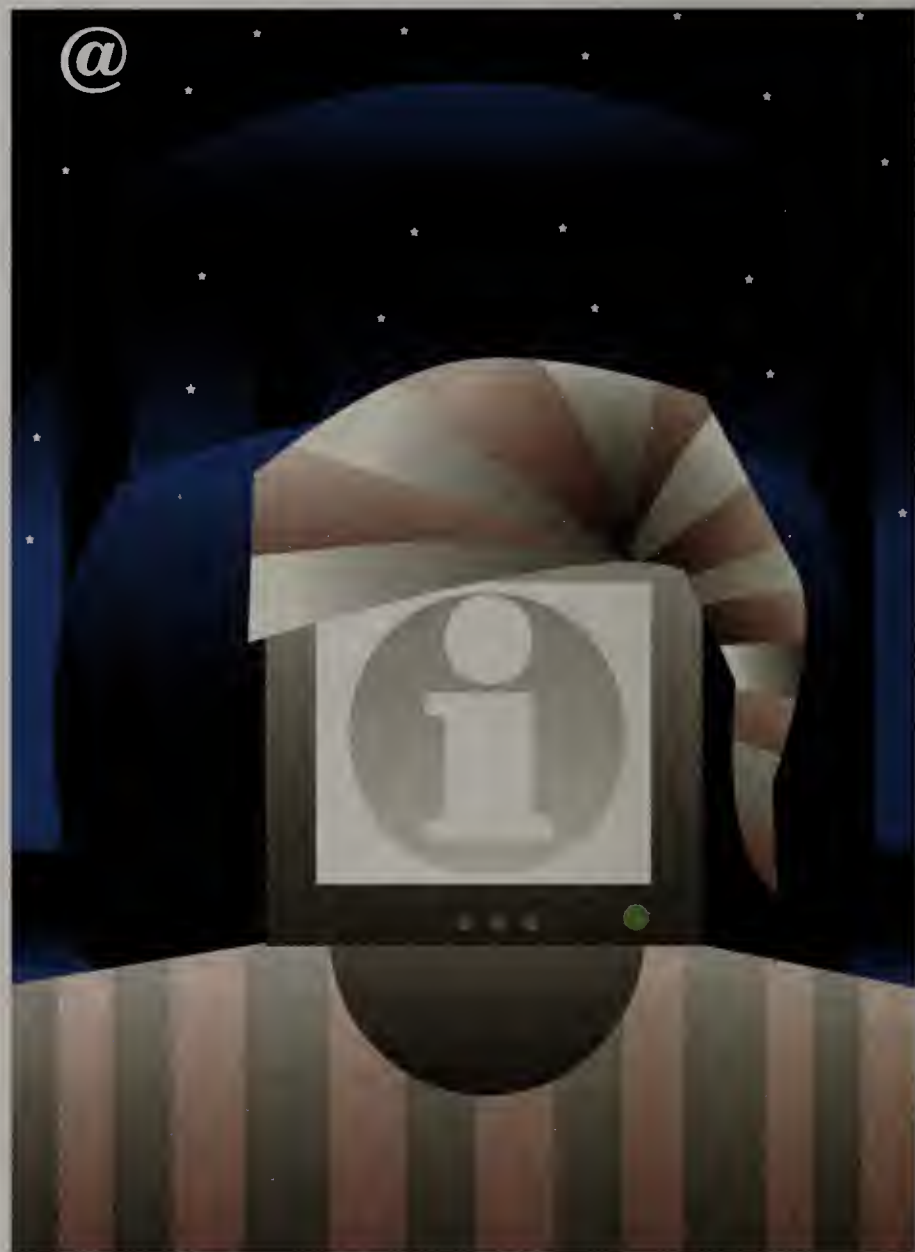
BY JOHN SVIOKLA

CUSTOMERS DON'T CARE what time it is when they do business—companies make them care. If you want to win them for life, be there whenever and wherever they want you to be.

Robert Woodruff, the man who took brown, bubbly sugar water—Coca-Cola—and turned it into a global cash machine, had a famous saying: “I want Coke to be within arm’s length of desire.” With that simple statement, Woodruff set out to make Coca-Cola the first ubiquitous product in the world.

Today, Coca-Cola is the best example of what I call a three-dimensional marketer. The three dimensions are who, where and when. Coca-Cola does a pretty good job of knowing who buys Coke, and making it available wherever and whenever customers want it—mostly through vending machines and an extraordinary distribution network.

Until the Internet came along, this “anywhere” strategy seemed relevant to just a narrow range of marketing companies like Coca-Cola. Yet with cheap, ubiquitous technology available to any company today, there’s no reason why everyone can’t try to be a 3-D leader with an anywhere, anytime strategy based on clear customer knowledge and targeting.



We’re already seeing market leaders such as AOL and Fidelity follow Coca-Cola’s lead. You can currently get AOL via its own ISP, over the Web, through the television, and on cell phones and PDAs; the company has plans to put AOL in physical locations such as schools, ATMs and Kinko’s. Fidelity was one of the first companies to make trading and financial information available to customers on all forms of wireless devices. Recently, it announced a joint effort with GM to offer access to Fidelity accounts in all GM cars.

Why are AOL and Fidelity heading this way? If all people will have the potential to be connected at all times in all settings through the Internet and wireless phones, then you always want your product or service available to them. Imagine the power of taking a category of valuable products, such as financial transactions, and making it available all the time, everywhere. Not only will products and services be accessible at the

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consumer's moment of greatest interest, but the potential exists to stimulate further demand and alter patterns of usage.

Product or service ubiquity is a race where being first means everything. The company that reaches far beyond its nearest competitor in terms of anywhere and anytime access will gain virtually unshakeable market share. Pepsi has been chasing Coca-Cola for 80 years and has not yet made a significant dent in Coke's market share. Likewise, those financial services companies that try to compete with Fidelity will lose if Fidelity makes its way to everywhere status.

With ubiquitous availability comes an understanding of your

to contact him cheaply and efficiently, it cannot influence his buying decision to come to McDonald's on a particular day instead of going to Burger King.

Not surprisingly, *when* is the most misunderstood and least pursued dimension of marketing. The legacy of traditional shopping and working hours has led most companies to ignore its potential. Yet there is nothing more important to revenues and market share than understanding when someone is in the mood to buy. Some mainstream companies have made blunt efforts to discover the when of their customers' desires. For example, 7-Eleven in Japan restocks 20 percent of its stores

five times a day to meet the morning, lunch, after school, dinner and after-dinner demands of its customers. This builds trust in the minds of its customers because 7-Eleven will have what the customers need, when they need it. Other nascent instruments include timing car company ad banners to appear when someone is searching in the automobile category on Yahoo.

The company that reaches far beyond its nearest competitor in terms of anywhere and anytime access will gain virtually unshakeable market share.

customer that is simply not possible in a place-and-time constrained context. Letting people do business with you whenever and wherever they want gives you understanding of their natural patterns of buying activity—their true desires. But you can't do that without making your products available 24/7. Banks have gained a glimpse of the far-reaching power of 24/7 availability: Online customers are 50 percent less likely to switch banks, and those who pay bills electronically are even less likely to leave. Today there are companies that excel on one or two of the who-where-when marketing dimensions, but not all three.

Direct marketing companies such as Lands' End know *who* reads its catalogs and a little bit about where. These companies analyze the who so that they can create new offers and achieve more yield from their existing customers. They know where someone lives, but they do not know where they usually shop, where they buy goods.

Where can also mean big business: The great retailing companies have the where down to a science. Ever since the days when Sam Walton piloted his small propeller plane across the heartland of America to survey potential new sites for a Wal-Mart, companies like his and McDonald's have turned the issue of where into high art.

These companies' locations have made them staggeringly rich. Famed for its ability to crack the code of site selection, McDonald's sees 45 million customers a day—Wal-Mart more than 90 million a week. Yet these two companies know virtually nothing about their individual customers. There is no individual profile of each customer, only aggregate statistics to predict what type of customer will visit and where. Because McDonald's does not know who that individual is and how

When you put a 3-D strategy in place, make sure you put concrete measures in place. You need to show that this increased clarity in marketing can attract more customers to more profitable products more efficiently.

Technology is key to this who-where-when initiative, and there are three steps you can take to integrate a 3-D strategy with your technology strategy.

First, recognize that each new interface you create is a new challenge—and opportunity. You must have a technology architecture that can help create unity for your customer, not new and different interfaces each time. Imagine if Coke came in different size bottles or in different colors every time you bought it; there would be no brand as we know it today. That is what you need to keep in mind as you take your customer through different menu trees, voice mails, e-mails and Web interfaces.

Second, make sure you link your interface architecture to your customer value management approach. Each interface point is a potential control point for cross-selling, quality and service.

Third, show your senior management that your information systems control or influence what your management systems can do. Always drive to create management systems that are at least as fast and flexible as the customer's buying cycle. Cisco can close its books every night. Its business cycle is that fast. Can you? **CIO**

John Sviokla, vice chairman of Diamond Cluster International, a Chicago-based consultancy, operates in 3-D all the time. Reach him anytime, anywhere at getreal@cio.com.



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Inside

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ing the ideology of IT,
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business operations
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FedEx CIO Robert B. Carter
has a stiff but straight-
forward mission for his
staff: to be the world's best
applied technology team.

Next Day Change Guaranteed

FedEx delivers change management

BY MARK GORDON

Got a great management story to tell? Send it via e-mail to Management Editor Edward Prewitt at hotseat@cio.com.

CHANGE HAPPENS, BUT MANAGING change to your advantage is another matter. "A capacity to change is indispensable. Equally indispensable is the capacity to hold fast to that which is good," noted cold warrior John Foster

Dulles. Since it began operations in 1973, Memphis, Tenn.-based FedEx has shown an ability to change without losing touch with its essential mission. External conditions such as technology and competition have

shifted enormously during that 28-year period, yet FedEx has been able to accommodate them all, introducing new services and systems alike without the wild fluctuations in growth, profitability, efficiency or

PHOTO BY JACK KENNER



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HOT Seat

employee morale that have afflicted most companies.

At the heart of this ability to manage change is an aggressive, even visionary, approach to IT. "One of the exciting things about FedEx is that people at every level of the organization understand the importance of information," declares Robert B. Carter, the company's 41-year-old CIO and executive vice president. "IT takes a very prominent place at the strategic business discussion level within the corporation in a way that allows funding, focus and initiative to flow."

Carter's role at FedEx is evidence of that. Appointed last year to occupy a position first held by James Barksdale—the James Barksdale who went on to become president of Netscape Communications—Carter leads an IT empire that includes 5,000 employees, seven domestic data centers, and a \$1.5 billion annual budget for IT infrastructure, capital and expenses.

FedEx founder Fred Smith, arguably the inventor of the express delivery industry, has always viewed IT as the core element of his company's business formula. As early as 1979, Smith had this to say about the role of IT in his industry's future: "Information about the package is as important as the package itself." Now that's vision! Smith's prophecy was uttered around the same time FedEx introduced COSMOS (Customers, Operations and Services Master Online System), the world's first global shipment tracking network based on a centralized computer network.

The years since have featured one expectation-shattering IT innovation after another. In 1981, the company inaugurated the use of bar code labeling in ground transportation. In 1984, FedEx rolled out a PC-based automated shipping system

idated four of its five operating subsidiaries under the FedEx brand name and moved most of its IT, sales and marketing staff into a new company, FedEx Corporate. At the same time, FedEx realigned the relationships of these companies to one

the world," he says. "We also use IP multicast technology to pipe that same programming through our intranet into IP-TV viewers that our people have at their desktops."

Communication about the reorganization was outstanding, says Alex Vergos, a Memphis-based senior technical adviser whose job involves the automated routing of packages through FedEx's four domestic air hubs. "We were informed of what was happening very early on. All the steps were laid out clearly through e-mail and FXTV. Even when I wasn't impacted directly, I still knew what was happening throughout the company." The reorganization was completed by June 1, 2000—on schedule, of course—without any loss in service quality.

Rather than having a distancing effect, video broadcasts create a personal connection, says IT Manager Brodie Johnson. "People in my organization think FXTV is the greatest thing in the world because it allows them to get information directly from senior management and that makes a big difference," he says.

Adds Carter, "Part of getting a large team to go do something is for them to sense some level of passion and urgency. It is not enough to simply have a new work request show up in their cube."

Change Partners

If only change management were as simple as communicating executives' directives. The new economy has obsoleted command-and-control meth-

AT A GLANCE

Inside FedEx

The Company: FedEx (www.fedex.com), with revenues of \$18.3 billion in 2000, is the world's largest express delivery company and a leader in freight and small-package delivery.

The Challenge: FedEx creates value with IT—but technology changes fast in a competitive market.

The Solution: FedEx uses IT to create change and communicate it throughout the company. The company recently realigned its subsidiaries via a Web-based interface and conveyed the new strategy and operating details to employees on its intranet.

for customers moving more than five packages per day. In 1994, the FedEx website, www.fedex.com, became the first to let customers track their packages on the Internet. Two years later, that capability was extended, allowing customers to create shipping labels and order courier pickups.

From Within

The most significant recent change at FedEx was a massive reorganization announced Jan. 19, 2000. The company consol-

another, aiming to provide customers with a single point of access to sales, customer service, billing and automation systems.

In a change of this magnitude, communication is essential. For this, the reorganization relied on IT. Carter's staff set up and ran FXTV, FedEx's closed-circuit television network. The satellite-based FXTV is one of the critical resources available when Carter undertakes a major project. "We can set up broadcasts at any time and go live with our employees around

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So ask yourself. How smart is that?

HOT Seat

ods, says Susan Annunzio, a principal with the Chicago-based consultancy Nextera and coauthor of *eLeadership: Proven Techniques for Creating an Environment of Speed and Flexibility in the Digital Economy* (Free Press, 2001). "Leaders in the past knew the direction of the company. They could tell people where to go and how to get there because the rules of competition were more predictable," she says. "Today, good leadership some-

times trip off his tongue as easily as his own name. "Our company supports people, service and profit," he says proudly. "We do that by focusing on collaboration, innovation, efficiency and profitability. Our goals are to grow our core transportation business, our international presence, our logistics services and our e-business."

To be sure, not every employee is a Brodie Johnson. Yet, according to Annunzio, every organization contains a cadre of

The business units consider us their trusted partners. We are intense competitors with the best solutions in the world."

Dollars and Change

The value of change is measured by one rubric: the bottom line. If customers don't buy the product, then change efforts have failed. "We have an IT team that feels empowered to drive solutions through to the customer," Carter says, "but the initiator of change is our cus-

sive." Ketner has been working with FedEx to improve the shipment of small automotive parts from his facility to dealers worldwide. "We had needs," he says, "and we approached FedEx for opportunities to solve them. They have been very willing to work closely to blend their systems expertise with ours." FedEx's IT improvements have cascaded down the supply chain. "In today's environment, there is ongoing pressure to be responsive to customer needs while maintaining cost-effectiveness," Ketner says. "Partners like FedEx who can translate their expertise into IT solutions create that opportunity. It has allowed us to serve the customer and eliminate waste from our system."

This emphasis on IT innovation has gained FedEx a 30 percent share in the highly competitive business to consumer express delivery market, according to Chris Newton, a senior analyst of supply chain strategies for AMR Research in Boston. "FedEx knows that without IT their business is dead," he says. "When you think about it, point A to point B is a commodity business. Anybody can do it. What's important are the value-added services you put around package movement, especially the ability to see into the movement itself. That is what FedEx is selling. That's how they're positioning themselves with clients."

Founder Fred Smith couldn't have said it any better himself.

Mark Gordon is a freelance writer in Barrington, R.I. He can be reached at markgordon@att.net.

"People at every level [of FedEx] understand the importance of information. IT takes a very prominent place at the strategic business discussion level."

—FEDEX CIO AND EXECUTIVE VICE PRESIDENT ROBERT B. CARTER

times means admitting that 'Although I have a vision for where we'd like to be, it is a tough world and I can't say with certainty that we'll get there.'"

The shifting sands of competition require that companies elicit an entrepreneurial spirit from workers at every level of the organization, communicating the leaders' vision but leaving the implementation up to individuals. Companies good at change do this well, Annunzio says, but companies struggling with change are often characterized by a lack of information flowing back and forth.

If Annunzio is correct, then Johnson sends FedEx to the front of the class. The company's goals and operating prin-

change agents who make all the difference. "I call it the 20-60-20 rule," she says. "Twenty percent of your people are inner-directed high achievers. At the other end are the 20 percent I call 'the miserable.' Ninety percent of change-management dollars are wasted trying to motivate this group. The key is the 60 percent in the middle. You have to get them to imitate the achievers, to become your allies and agents of change."

An ally shares in your plans. An agent executes your desires. So, what is the desire of CIO Carter? "The vision I sell to our employees is fairly straightforward: We are the world's best applied technology team.

tomer. We run a lot of focus groups and forums in which we talk to customers about their dream applications or their next breakthrough in running their businesses."

Senior Technical Adviser Vergos concurs: "I get all kinds of encouragement to think more creatively, to do more for the customer," he says. "The company doesn't push me from behind, they pull me from the front."

James Ketner, manager of the General Motors Service Parts Operation plant in Lansing, Mich., sums up the customer's perspective succinctly: "The more responsive a vendor is, the more chance we have to do business with them. FedEx has been very respon-



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HOT Seat

HINDSIGHT | JOHN HILL

IT Ideology

WHEN JOHN HILL joined Danbury, Conn.-based Praxair as CIO in 1997, he brought global experience and business acumen to a Fortune 500 company with an IT model that was, in his words, "immature" and "a collection of local organizations." A leading producer of industrial gases and surface coatings, Praxair operates in 43 countries and had sales of \$5 billion in 2000. In addition to establishing global

standards and some central control, Hill aimed to get his 500-member IT staff excited about Praxair's business mission and performance as well as its technical operations.

CIO: How did you communicate a new vision for IT?

Hill: It required some ideology, some principles. I introduced a slogan: "FIRST Things First." The acronym FIRST stands for Fundamental Impact on Results, Stock price or business Targets. That means everyone in IT should only be working on projects with clear business

objectives. Another thing we did was develop a gating process. In the idea phase, there has to be a clear articulation of a project's business impact, the anticipated value, where value would come from, what resources might be needed and who the clear business owner or sponsor would be. Without these, a project cannot leave the idea phase. If it does, it goes into a more classic feasibility analysis: providing greater detail on business value, defining resources and risks, determining if it's a build or a buy decision.

Was there any resistance from IT staffers?

Some. We found that people needed basic financial training so that they could create justification for their business plans. What's discounted cash flow? What's the difference between expense and capital? We put together a training class on financial fundamentals, linking them to our gating process so people had templates to do a discounted cash flow on a project. So business language would be part of the IT training.

You're grooming IT people to influence business operations. I think so. We want to have the IT folks evolve into business roles. We've done it the other way too—bringing in sharp businesspeople and giving them technical training or sponsoring them to get master's degrees in IT. It's healthy for an organization to have that movement between functions.

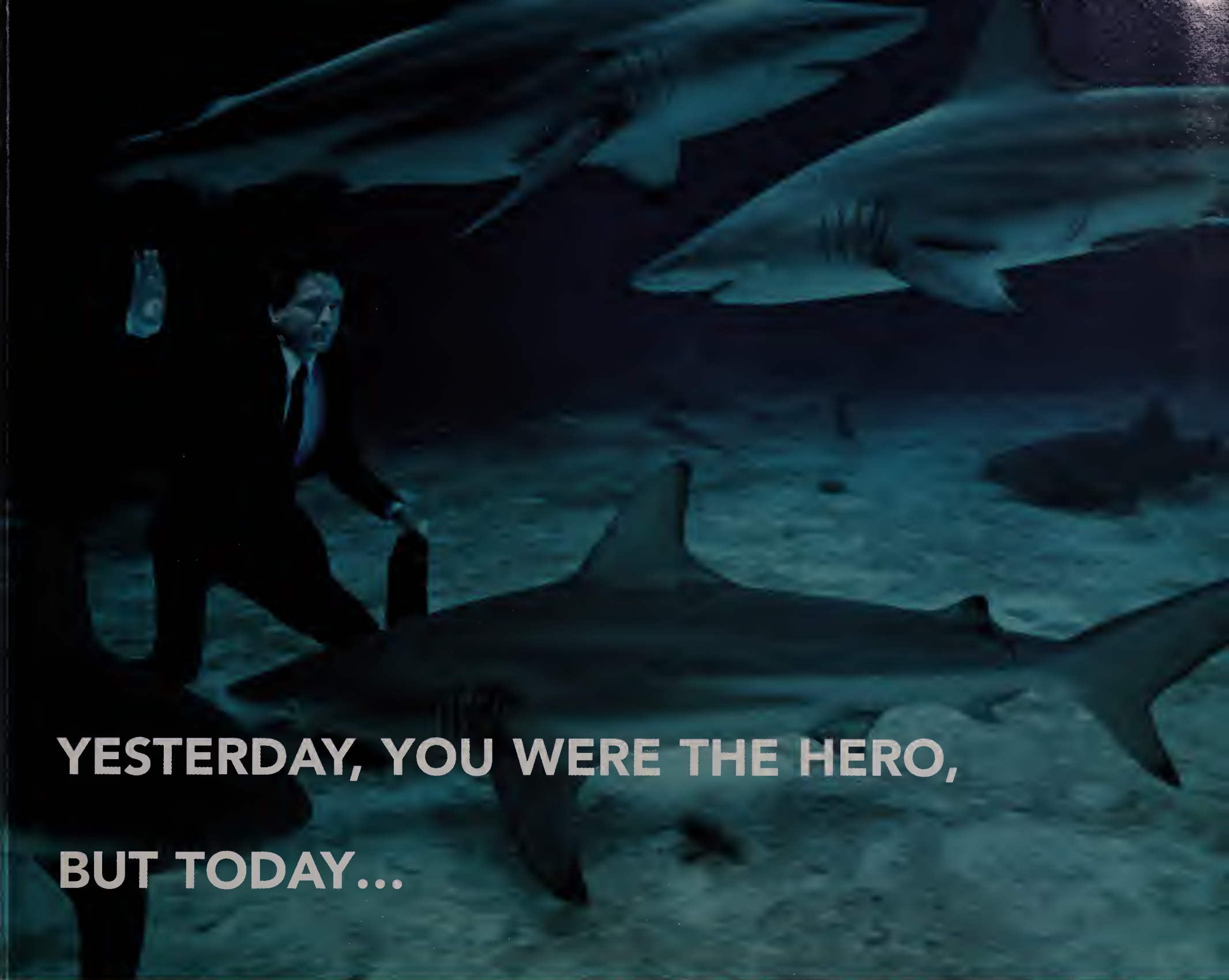
You report to the CFO. Does that relegate IT to a service function?

Managing IT is really managing two kinds of functions. One is a utility, which is cost-driven and focused on service levels. The other is like a venture capital fund where you manage resources with the idea of maximizing returns. Rather than focus on the broader reporting relationship, I've approached the more fundamental challenge of ensuring that IT directors participate in strategy-setting and management for the organizations they support. **CIO**

—David T. Gordon



At Praxair, says CIO John Hill, "IT is a partner at the business table."

A man in a dark suit and tie is running through dark, murky water. Several large sharks are swimming around him, creating a sense of danger and urgency. The scene is dimly lit, with a blueish-green tint.

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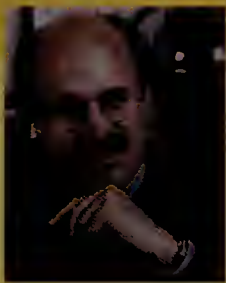


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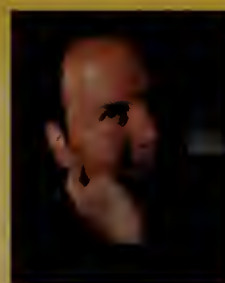
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Danny Hillis
Co-founder
Applied Minds



Darrell Zavitz
Global Director
I/S for the S&P
Business Group
The Dow Chemical Company



Mark Nassutti
Vice President of Marketing, North American Retail and Global Branding
Eddie Bauer

SUNDAY, AUGUST 12

8:30 AM - 1:30 PM

Riverwalk Golf Tournament

CIO hosts a golf tournament at the Riverwalk championship course.

3:00 PM - 5:00 PM

Registration

7:00 PM - 8:30 PM

Café 100 Welcome Reception

Meet and network with other participants, Award Honorees and Symposium Partners.

8:30 PM - 10:30 PM

Golf Awards Ceremony

Hosted by Tivoli Systems, Inc.

MONDAY, AUGUST 13

7:30 AM - 8:20 AM

Registration and Breakfast

8:30 AM - 9:30 AM

The CIOs Future: Leadership in an Age of Creative Destruction

Paul Saffo
Director, Institute for the Future

Welcome to a brave new world of creative destruction, where economies of structure displace economies of scale, and information systems become more strategic than ever. Saffo tells us how to turn the old rules upside down for success in this world.

9:45 AM - 10:45 AM

Tri-Channel or Toast: Internet-Driven Innovation in Apparel Marketing

Mark Nassutti
Vice President of Marketing for North American Retail and Global Branding
Eddie Bauer

Nassutti shares not-so-obvious learnings about how to use the power of the Internet to drive not just an online presence but a fully integrated multi-channel marketing strategy that wins new customers and maximizes their value to the enterprise.

11:30 AM - 12:15 PM

Industry Briefings

Our Corporate Partners present case studies and histories.

12:15 PM - 1:00 PM

Industry Briefings



The Famous Hotel del Coronado

Recognized as a one-of-a kind setting, the Hotel del Coronado offers a unique way to experience the elegance of another era, and is proud to be chosen to host the CIO 100 Symposium and Awards.

1:15 PM - 2:30 PM

Luncheon Presentation

CIO magazine, in conjunction with the Critical Infrastructure Assurance Office, hosts a special presentation on security and privacy issues.

2:45 PM - 3:45 PM

Creativity and Technology

Danny Hillis
Co-founder, Applied Minds

Creativity is the driving force of technological change, and is a key ingredient to the successful application of technology. But what does this really imply about how we should manage and encourage creativity?

3:45 PM - 4:45 PM

CIO 100 Honoree Panel Discussion

In this free-wheeling roundtable, our Award Honorees share the business and technology strategies that earned them the CIO 100 award.

4:45 PM - 5:30 PM

Informal Networking/Free Time

5:30 PM - 7:00 PM

Café 100 Reception

Catch up with other participants, share ideas and experiences, and plan tonight and tomorrow.

TUESDAY, AUGUST 14

7:00 AM - 7:45 AM

Breakfast

7:45 AM - 9:00 AM

Innovation Versus Inertia: Breaking the Back of The Innovator's Dilemma

Geoffrey Moore
Founder and Chairman
The Chasm Group

Last year, Geoff Moore shared his prescriptive agenda for tackling the "innovator's dilemma:" how can you possibly succeed in innovation when the very management processes by which you maintain your current success are working powerfully against you? This year, he returns to discuss what lessons he has learned from his initial engagements with Fortune 2000 companies.

9:00 AM - 10:00 AM

Leveraging Alliances to Lead Innovation in e-Business

Darrell J. Zavitz
Global Director, I/S for the S&P Business Group
The Dow Chemical Company

Dow continues to combine strength and sensibility with speed and agility in building its e-Business strategy. By leveraging their globally integrated IT infrastructure with new Internet-based technology, Dow is demonstrating innovation on a broad range of global projects that are creating value for customers and shareholders.

10:40 AM - 11:25 AM

Industry Briefings

11:30 AM - 12:30 PM

CIO 100 Honoree Panel Discussion

12:35 PM - 1:55 PM

Luncheon

2:00 PM - 3:00 PM

Transforming the Corporate Landscape

John Seely Brown
Chief Scientist, Xerox Corporation

With dot.coms becoming dot.toast the coast is now clear for starting serious new companies and evolving existing companies into enterprises that will restructure industries and — more radically — potentially restructure the entire corporate landscape.

3:00 PM - 4:15 PM

Executive Mindshare Sessions

Led by senior CIO Magazine Editors, these intimate groups exchange experiences and solutions on:

- IT Value: How to Do More with Less — and Prove It
- Integration Challenges: Technology's Just the Beginning
- IT Sourcing: The Best Options for Tough Times
- Internet Security: Do You Know Where Your Vulnerabilities Are?
- Customer Relationship Management: Bursting the Hype Bubble
- Strategic Leadership: Exerting Influence in the Enterprise
- E-Business: Is There an Exchange in Your Future?

4:15 PM - 6:00 PM

Informal Networking

Trade notes with other participants, relax and catch your breath, then get spiffed up in that tux or gown for the night's festivities.

6:00 PM - 7:00 PM

Café 100 Reception

See and be seen is the order of the evening.

7:00 PM - 9:30 PM

CIO 100 Awards Dinner and Ceremony

You are invited to attend a special black tie reception, dinner and awards ceremony to recognize this year's CIO 100 Award Honorees.

9:30 PM - 10:30 PM

Dessert Reception

Hosted by PeopleSoft, Inc., CIO 100 Awards Ceremony underwriter.

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- Learn why investing in new technologies is critical to long-term profitability
- See how companies have used their investments to gain a competitive advantage
- Discover the pitfalls that lie in wait for the venturing CIO

Nothing Ventured,

PHOTO BY MARK VAN S



Guy Battista smiles when he hears those recorded announcements saying, "Your call may be monitored for quality assurance." He's been there, done that. Last September, the First Data Corp. (FDC) CIO went, as they say, "double-jack" with an operator, listening in to calls at an Irish call center 5,000 miles from FDC's Atlanta headquarters. That kind of attention to detail is a regular part of Battista's evaluation process when FDC, a \$5.5 billion financial services company whose subsidiaries include Western Union and TeleCheck, is thinking about investing in a company. ■ In this case, FDC was looking to invest in Fexco, a Killorglin, County Kerry-based customer service outsourcer.

Nothing Gained

*When he became Eastman Chemicals' CIO last year, **Roger Mowen** insisted on founding and managing an independently budgeted venture group within the organization.*

(If you dial the toll-free number on the back of a can of Guinness, you'll reach a Fexco call center.) FDC makes no secret of its desire to expand globally, and Fexco, which already works in Europe with Western Union, seemed like a logical way for the American company to plant its flag on the continent.

But before investing, Battista needed to make certain that Fexco was what FDC wanted. He wasn't satisfied simply meeting the Fexco suits or bench testing their software; he wanted to watch the apps in action and see how the service representatives treated customers. He came away impressed. The software worked; the operators were polite and efficient. Battista and his team gave the deal the thumbs up. And in December 2000, FDC took a 25 percent equity stake in Fexco.

Battista, an 11-year veteran of FDC

gain a competitive, early-mover advantage. And given the rapid rate of technological innovation that advantage is more critical than ever before.

"What we're talking about," says Nancy Koehn, a business historian at Harvard Business School, "is not just a chance to be on the new playing field, but a chance to help set the rules. We are talking about a chance to help set the standards. And that is extremely important." As a result, predicts Koehn, no company will prosper without looking outside its walls. Without, in other words, corporate venturing.

There's risk involved, of course. Richard Shaffer, president of the New York City-based VC firm Technologic Partners, says that to succeed as a venture capitalist you must be continuously willing to bet your career. The same holds true, Shaffer says, for CIOs attempting to play that role

Companies see investments as a way to gain a competitive, early-mover advantage. And given the rate of technological innovation, that advantage is more critical than ever before.

and CIO since 1997, didn't set out in life to be an investment adviser or a venture capitalist, but his business and technical skills have played a crucial role in FDC's enterprise investment strategy. "Today," says Battista, "I had three different conference calls on three different companies [targets for acquisition, targets for investment]. And tomorrow I'm meeting with our president to go over them."

THE CIO AS VENTURE CAPITALIST

This same scenario is playing out in boardrooms and corner offices all over the country as businesses turn to their CIOs, leveraging their technical skills and business knowledge, to help guide their investments in emerging technologies. Companies see investments as a way to

within their companies. The recent wave of corporate venturing has already claimed victims. Former Fireman's Fund CIO Deems Davis left in February 2000 after a couple of ventures he championed for the Novato, Calif.-based insurance company failed. In the late '90s, Motorola closed an entire corporate venture department. Blood flowed; bodies moved. And, of course, the economic downturn of 2001 has made venturing riskier still. However, says Heidi Mason, managing director of Silicon Valley-based venture consultancy the Bell-Mason Group, while dollars may be drying up, innovation is still happening at a record pace. In fact, it may be easier than ever for a company willing to venture to tap in to that innovation.

"Three years ago, trying to pay the ante

FDC CIO Guy Battista *didn't set out in life to become an investment adviser or a venture capitalist. But now both roles are part of his job.*

to get in was too high; you had to pay nosebleed prices," says Mason. "But now a lot of that is coming back to the realm of the real."

Whatever the immediate economic climate, there's no question that for businesses seeking to become industry leaders, managing an investment portfolio is quickly becoming a critical part of a CIO's job.

WHY FIRST MOVERS WIN

If nothing else, 30 years in business has taught Eastman Chemicals CIO Roger Mowen one thing: First movers win, laggards lose. He knew that the \$5.3 billion Kingsport, Tenn., giant had to be flexible and nimble to succeed in the new economy, and he saw venture investing as the way to achieve this. When he took over the CIO job in February 2000 (prior to that he was Eastman's vice president of global customer services, a position he still holds), he insisted on founding and managing an independently budgeted venture group within the organization.

"To me, this was about speed," says



Mowen, who boasts that he can get a major investment deal done within a single day. Developing new technologies within Eastman was, in Mowen's opinion, a much slower route to industry leadership than hunting for them in the field.

Mowen's group identifies investments that could give Eastman a strategic advantage, such as an online marketplace or an inventory management technology (see "The Eastman Portfolio," Page 90). In each case, it is a technology that has a chance to change and improve the way Eastman conducts its business.

Mowen sees several long-term advantages to investing in the companies developing new technologies rather than outsourcing business processes to them or simply buying their products. He believes that an investment "tells our organization that this [product] is critically important. It's not just a solution we're using as a customer. We think it's best in breed and so it's imperative that you use this." This message, Mowen strongly believes, speeds the rate of adoption with the company.

Eastman's equity stake "also tells our trading partners how good we think this is. We put our money where our mouth is." In this way, Eastman increases the chances that its partners will follow its technology lead—the essence of the early-mover advantage.

The venture approach to research and development also minimizes the damage caused by failed projects undertaken in-house. Rather than deal with the layoffs and morale problems after something goes down the tubes, says Mowen, "I can easily walk away and move on to the next one." He knows that only two or three out of every 10 investments will actually work. And while no company in his portfolio has gone out of business, it's just a matter of time. "Check back in a month," he notes dryly.

FOR EXAMPLE...

Eastman has already gained a head start on its competitors through one investment. In March 2000, Eastman took a significant stake in Fairfax, Va.-based

XML vendor Webmethods.

Improving connectivity to Eastman's customers is central to Mowen's vision. In an economy where it is difficult to gain and maintain customers, better connections and the improved service that results are, in his mind, the keys to building customer loyalty. "If my experience is so good on Amazon.com, why would I even think of going to Barnes & Noble?" he asks. "I don't think consumer behavior patterns are a lot different in the B2B world." By using Webmethods' XML to connect to suppliers and customers, Mowen created transparencies in the supply chain, giving Eastman a view in to its trading partners' inventories. Eastman now knows how much of any given chemical a customer has in stock. Because of the enhanced visibility, Eastman is able to make more accurate inventory decisions.

As of December, Eastman had connections in place with 15 supply chain partners. And these partners, according to Mowen, are going to their partners,

HOW THE FORTUNE 500 CAME TO BE

The second industrial revolution was built on investing

Large companies investing in or incubating smaller companies with interesting ideas is hardly new. In 1918, for example, DuPont took a 25 percent stake in a relatively new company called General Motors. In fact, throughout the second industrial revolution, from 1880 to about 1930, companies such as Coca-Cola, CSX (founded in 1901 as US Steel) and Dow Chemicals often invested in smaller companies with new and innovative industrial technologies in order to gain an early-mover advantage. The strategy worked. According to Harvard Business School historian Nancy Koehn, 247 out of today's Fortune 500 were created during those 50 years. Venturing took place between the industrial revolution and the information revolution, but on a smaller scale and at a slower pace.

Then came the phenomenal Nasdaq run-up of the late '90s and a new wave of venturing began. "Companies were getting whacked across the snout and asking what happened," according to Heidi Mason, managing director of venture consultancy Bell-Mason Group in Silicon Valley. "This little upstart came along and messed with my business." The eye-popping dotcom stock valuations woke many corporations to the Internet's business-transforming possibilities.

Sources say the current market downturn will not discourage the trend in corporate investing, but how many new Fortune 500 companies this wave of venturing will produce is yet to be determined.

—B. Worthen

telling them to get on the XML bandwagon. "We get these calls all the time from customers asking us to talk to them about XML and getting connected," says Mowen.

Through this viral-like spread, Webmethods' version of XML becomes the industry standard. That's good news for Eastman, which will probably never have to retool or reengineer its connections to its customers and suppliers on anything but its own terms.

It's also good for Mowen's portfolio.

START THEM UP

By Jan. 2, 2000, it was evident that the Y2K bug was not going to make planes fall out of the sky, and the airline industry turned its attention to B2B e-commerce. Like most airlines, Northwest spends billions of dollars a year on parts and usually has more than a million dollars in inventory at any given time. Northwest CIO John Parker knew an online airline parts procurement marketplace was inevitable. The question was what role Northwest should take. Did the St. Paul, Minn.-based carrier want to wait for someone else to start

the company and become a customer, or did it want to take it upon itself to create the exchange?

After listening to dozens of pitches for parts-procurement exchanges, Parker decided to take the lead. This meant investing the founding partner share, several million dollars, and placing members of the Northwest team in key positions to lead the nascent Aeroexchange, which it founded in the summer of 2000. (Sticking with the strategy, one of Parker's IT leaders has also served as interim CTO at Jeta.com, a Naperville Ill.-based airline fuel marketplace in which Northwest also took an early and active role.)

The biggest factor in Parker's decision was the opportunity a major investment would create to influence Aeroexchange's direction. Northwest needed the Irving, Texas-based Aeroexchange, which it jointly owns with Air Canada, America West, FedEx, alliance partner KLM and several others, to provide back-end integration to its participants so that even an airline without a sophisticated ERP system could reconcile parts bought through the marketplace with its existing inventory chan-

Northwest CIO John Parker knew an online airline parts procurement marketplace was inevitable. The question was, Did Northwest want to be a customer or a founder?

The Eastman Portfolio

When he became CIO of Eastman Chemicals in February 2000, Roger Mowen started a venture capital group dedicated to investing in emerging technology companies that would help the chemical giant stay ahead of the competition. Mowen's investments fit into five categories: online marketplaces, trading communities, value-added services, business process applications infrastructure and general contractors, companies that help build other companies. In each case the investment was between zero and \$5 million. Here, in alphabetical order, are Mowen's investments as of the end of January, with his commentary.

INVESTMENTS

Asera A general contractor that integrates a client's existing applications. "A large company like ours doesn't use those kinds of offerings broadly. So we wanted to put pressure on our own organization to consider them for jobs, and we felt like an equity investment in that kind of new model would help convince our organization to use this kind of option." Mowen thinks that Asera's ASP model is particularly well suited to the chemical industry and that "they have a strong management team."

ChemConnect This online chemical marketplace was Mowen's first investment. "We actually knocked on their door before they even thought about equity from the brick-and-mortar side. We believed that we needed to have a portfolio of options and one or two investments in different marketplaces with different models. And we thought that the



nel. If an exchange became dominant that did not offer ERP, Northwest would face a costly implementation.

Several of Northwest's partners such as FedEx already had ERP systems and therefore didn't count ERP as critical. But the dominant role Northwest played in Aeroexchange's founding ensured that the exchange, which went live in the first quarter of 2001, will indeed offer Web-based ERP capabilities.

A VENTURING WE WILL GO

The CIO's ideal skill set—knowledge of technology, familiarity with his company's business goals—makes him a good candidate to help lead a corporate venturing initiative, but it in no way guarantees success. (See "The Big Three," Page 100.) The fact of the matter is that while opportunity abounds, there is an even greater amount of risk. Investments fail, and startups rarely succeed. "It's like turtle eggs," says Technologic's Shaffer. "A turtle swims ashore, lays thousands of eggs and most of them die. But the few that survive are enough to propagate the species."

The turtle hedges its bets by laying lots

ChemConnect model fit us best because we have a broad range of products, some specialty, some commodity. Where a marketplace like Chem Match is more in the commodity business, ChemConnect has a broader offering, and so we thought at the time that they were the best in breed to serve our broad product offering."

Commerx A general contractor that builds online marketplaces, most notably *Plasticsnet.com*. "We wanted to have on play in the plastics and polymer business, and there weren't many in that space. At the time they were the best available. Again, we have a chemical business and a polymer business and so ChemConnect was more of the chemical side even though they also do polymers. *Plasticsnet* was to serve our plastics or polymer business. It was to help our polymer guys learn from the marketplace and use the solution."

e-Chemicals A supply chain value-added service provider

that connects the systems of raw materials providers, chemical manufacturers, channel intermediaries and chemical purchasers. "At the time we made the investment, their business model was really that of a virtual distributor." With \$800 million globally in the distribution business, including \$300 million plus in the United States, "we wanted to have for our businesses not only classic brick-and-mortar distribution but also virtual distribution. This model has morphed several times, and they are one of the [investments] that has struggled."

eCredit.com A Web-based business process company that provides real-time credit and financing services. "What we do is we say we need a digitized solution for the finance industry, and then the VC's responsibility is to go out and find them. We are utilizing that solution in our credit area today."

Moai Technologies A business processes application com-

and lots of eggs. The same strategy is necessary to survive in the investment arena. The problem for the aspiring CIO venture capitalist, says Bell-Mason's Mason, is that laying tons of eggs and hoping some of them hatch is fundamentally at odds with the way most corporations work. Traditionally, large corporations take a cautious approach to new initiatives, testing the water with one project before committing on a larger scale. This, says Mason, is the best way to fail in the venturing world. "There has to be a minimum recognition that a portfolio strategy is better than a one-off strategy," she says. With a one-off approach there "is too much emphasis on one deal. And in any event, even if it wins wonderfully, you don't have any organization set up to repeat the win."

A narrow approach is what doomed the venturing initiative of the Fireman's Fund, says its former CIO Davis. In 1999, Fireman's Fund invested substantially in two insurance e-businesses. When those two investments came a cropper, Fireman's shut down its venturing operation. Davis left shortly thereafter.

There are other potholes along the ven-

turing road. Because failure is inevitable, Davis maintains that you must have the full backing of the CEO and the board before even thinking about playing venture capitalist. According to Eastman's Mowen, they must be committed to trans-

forming the business through venture investments. And the commitment, he says, must be long term. Since the successes are scattered among the many failures, says Mowen, "you can't just do it in

Continued on Page 100



Motorola Corporate Vice President Warren Holtsberg makes no investment without "a commitment from one of our businesses that they would embrace that company or technology."

The Eastman Portfolio

pany that provides negotiation software. "It is the technology we use on the Eastman marketplace, which is part of Eastman.com. We've done more than 100 auctions."

Patent and License Exchange An intellectual property marketplace with subscriptions from approximately 450 companies, universities and research centers. "We have a group that licenses polymer and chemical technology. We do that in a physical form today." The patent and license exchange "allows us to put that information online and access it globally 24/7. We can get a lot more reach. We have a business in licensing now and this is just another channel to our customers. We looked at three or four, and this was in our opinion the best in breed for the chemical industry."

Sequencia Corp. A business process application supplier that automates the inclusion of new products and processes into the supply chain. "We have a lot of batch manufacturing operations in Eastman chemical—you know we make a lot of

stuff. This technology helps us efficiently use batch chemical operations, so there is less inefficiency in the manufacturing of different formulas."

SESAMi.com An MRO marketplace for the chemical industry in Asia. "We have a large plant in Singapore—it's about a \$300 million investment. We have a partnership to offer MROs to our facility and offer that capability to other customers off of Singapore, which is one of the largest chemical complexes in the world. There are probably \$20 billion worth of chemical investments on that island. All the big names are there."

WorldWideTesting.com A value-added service provider that tests bulk commodities in 142 countries. "We sell products to customers, and they want to be assured that the product, the specification and the quality are exactly what we say it is. So there are labs out there that do that. And this is a digital offer-

Continued on Page 100

A FEW THINGS
YOU SHOULD KNOW ABOUT
Web security.



KNOW YOUR enemy.

Waking up to find that your mission-critical e-Business has been brought down by a 16-year-old hacker who was experimenting with known exploitable techniques would be disastrous. Unfortunately, dealing with a tenacious teen may be the least of your worries. The fact is business Web sites are attacked and probed on a regular basis by experienced hackers. Cyber attacks are launched in several varieties, with different strategies, but one common interest — to gain unauthorized access to your Web site. Being aware of defense mechanisms and security solutions designed to minimize risk is your best line of defense. But first you have to know what you're up against.

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In balancing the many day-to-day demands of IT management, it is impossible for you to focus your full attention on security matters. That's why outsourcing full systems security, including intrusion detection, vulnerability assessment and monitoring, to an accredited organization will ensure that your mission-critical Web sites receive the real-time attention they require.

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Digex successfully completed Ernst & Young's Cyber Process Certification (CPC) and the SAS70 Type II Review*. This represents a significant accomplishment in Digex's pledge to provide a state-of-the-art managed hosting environment with the highest levels of security and reliability. Digex also completed a rigorous and well-documented logical and physical security regimen to achieve certification by ICSA as a TruSecure Management Service Provider (MSP).





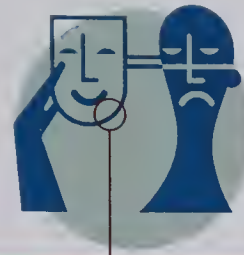
CYBER THIEVES

Your Web server is a place for your customers to enter and conduct business. But being open for business means that "undesirables" can potentially enter if you don't take precautions. Some of these intruders are harmless. But others are not content to just look, they would rather help themselves to your entire database of sensitive confidential customer information.

SOLUTION:

Constant Monitoring

Proactive systems analysis, monitoring and real-time testing are essential operations in the fight against unauthorized access. Secure socket layer (SSL) protocols and passwords protect e-Commerce transactions, while firewalls serve as barriers to allow only authorized traffic to Web and database servers. Protect operating systems with hardened secure server builds and by regularly deleting unnecessary services. Ensure secure remote access with strong authentication measures like token cards or biometrics. One-time passwords should also be used. The right technical response team is also essential to stopping real-time attacks before damage can be done. Intrusion detection systems can monitor and stop attacks in progress. Remember that cyber thieves also try to steal data streams between destinations, so fully encrypted VPNs can work to protect corporate data in transit.



SOCIAL ENGINEERING

Occasionally people will fool you. They will masquerade as vendors, contractors or sales personnel and attempt to physically access your facility. Once in, they gather critical internal data, destroy or steal equipment and corrupt databases. They also gain remote access by stealing an unsuspecting employee's password.

SOLUTION:

Education

Workplace access should only be granted to people with authorized ID cards and pass codes. Biometric palm readers provide an extra measure of authentication. Digital video equipment offers constant surveillance. Create "man traps" with defensive mechanisms that trigger in the event of unauthorized entry. Train employees to lock their workstations and to challenge unfamiliar personnel within their work areas. It's also important that confidential documents are shredded and important files are stored under lock and key. Create a tangible and highly visible defense perimeter to safeguard physical assets. Protect servers in a place that is both physically secure and weatherproof with back-up power supplies and redundant generators. Servers should be contained within a solid floor-to-ceiling reinforced concrete shell for maximum protection.



VIRUSES

With more than 30,000 known virus strains, the chances that your system will contract one at some point are pretty good. Viruses are ubiquitous and hard to avoid. And they are also becoming more sophisticated. Several new viruses can search address books and mail themselves to your contact lists, and even infect more than one operating system. Other viruses can change their name, and modify their attacks and displayed messages in order to be more difficult to detect, deny and eradicate. These nasty bugs replicate themselves through e-mail, attacking unsuspecting users and destroying systems, critical programs and files.

SOLUTION:

Active Virus Protection

Equip e-mail servers with the latest versions of antivirus software and mail scanner detection. Ensure antivirus signatures are current. Preconfigure and design servers throughout the enterprise so that they don't automatically open attachments. In addition to scanning for viruses on a regular basis, configure an "on access" scanner to start automatically upon system boot.



MALICIOUS ATTACKS

Hackers and other malicious people wanting to wreak havoc enter your servers through unprotected ports and services. The result ranges from public embarrassment to an all-out site shutdown. Often they take advantage of announced vulnerabilities that should have been patched, or use old login IDs that were never disconnected. These types of attacks can cripple a server, resulting in lost revenue.

SOLUTION:

Proactive Safeguards

Eliminate known or open vulnerabilities by applying the latest operating system and Web software bug patches. Implement file protection and access restriction to prevent file corruption. Network logins and access control lists prevent Web server entrance by the unauthorized. Vulnerability scanning, auditing and analysis will help determine where possible weaknesses loom. Shut down unnecessary processes and user IDs running on servers in the production environment that might be backdoors for hackers. Defining and enforcing auditing policies, processes, techniques and standards all help to narrow the scope against future attacks.



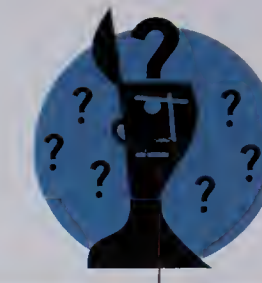
INTERNAL THREATS

Insider information and access provide the means for an unhappy employee to voice dissatisfaction. These individuals can corrupt or even destroy your systems by planting viruses in the network, exploiting bugs in code, or installing hardware or software without your approval. But internal threats do not come from just the "bad." Often a "good" employee will inadvertently make a seemingly harmless mistake, creating a high-risk security exposure.

SOLUTION:

Restrict Access and Permissions

Deploy sophisticated security measures limiting user access permissions and implement in-depth logging and alerting devices. Biometric identification, secure ID tokens, one-time passwords and encryption-enabled systems make it difficult for anyone who touches your servers to go undetected. Evaluate and review user account activity and delete orphaned user accounts to clear the reporting congestion and incorporate best business practices. Implement a well-defined personnel policy for departing employees to disable all user access. Preconfigure browsers to control what employees can and can't do.



PREPAREDNESS

The larger your e-Business becomes, the more vulnerabilities it is exposed to. Is your IT staff trained in the latest security measures and equipped to handle the ever changing and increasingly complex Web? We all know how difficult and expensive it is to find and retain top-notch security professionals with experience and necessary certifications.

SOLUTION:

Dedicated Security Experts

Even the most advanced technology won't perform to its potential without a skilled support staff. And it takes a lot of resources to train and certify a dedicated security team to successfully monitor mission-critical Web sites and protect corporate assets. Ideally, security personnel should be able to define and put best practice security policies in place, monitor network and server activities and be able to respond to security attacks rapidly and decisively. Expertise is required in firewall configuration and in the latest hacker tricks and techniques. It is also needed to identify vulnerabilities at the physical, system and file levels and a host of other security related issues.

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Digex TruDefense: TruDefense is the most advanced server-level intrusion detection system available. It proactively monitors customer servers, looks for attempted intrusions and stops them from impacting your site.

Digex Security Scan: Digex provides you with a monthly evaluation of your site's vulnerabilities for ongoing assurance that you are protected against attacks.

Digex Vulnerability Assessment: Digex makes your site safe by conducting monthly audits of your servers to detect unacceptable practices and suspicious activities.

Digex Virtual Private Networks (VPN): Digex uses triple DES encryption to ensure the most secured connection between business partners, multiple corporate offices or for your traveling/remote employees.

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the good times. You have to have continuity over a number of years or else there is no point in starting."

Furthermore, the CIO must understand the difference between traditional venture capitalism and the kind practiced by a successful corporation. While a VC firm, like the turtle, is playing for that one financial home run that renders all the failed investments irrelevant, a company benefits most when a usable technology or side business emerges. Motorola learned this the hard way.

For most of the '90s, the Chicago-based telecommunications titan had a ventures unit dedicated to investments with a five-to seven-year return window. What went wrong, says Warren Holtsberg, Motorola Corporate vice president and director of Motorola Ventures, was that "they spent a lot of time worrying about future businesses, things like life sciences and new fuel cell development, environmental systems." These technologies, although promising, were not core to Motorola's business.

In June 1999, Motorola tried again,

this time with a mandate that investments show strategic value to the company within 12 to 18 months, such as producing technology that could be used by a Motorola unit or bringing Motorola new customers. While the new group has spent more than \$100 million on 30 investments, none were made, says Holtsberg, without "a commitment from one of our businesses that they would embrace that company or technology."

THE BIG THREE

How to evaluate an investment

Professional venture capitalists' evaluation to-do list is surprisingly short—only three items long, according to Jim Savage, a cofounder of Longworth Venture Partners in Waltham, Mass.

First and foremost you must evaluate the company's management team. "The market is going to change," he says. "The technology and the product development will probably play out differently than they thought on paper. Things are too fluid, and you need a management team that is going to evolve and react as they get further into the business, and not every one can rock and roll like that." Only after the management team checks out should you move on to the two other items on the list: pursuing the market and creating the company's strategy for approaching that market.

—B. Worthen

IT'S NOT ABOUT THE MONEY

Mike Koehler, former vice president of technology at Ameriserve and Delta Air Lines, now COO of the Dallas-based Feld Group, a consultancy comprising former CIOs, says that it's important to keep the company's core competencies in mind when investing because the stock market doesn't really reward companies on the basis of sheer financial success. "The market sees that as a windfall prof-

The Eastman Portfolio

Continued from Page 92

ing that makes this information available to customers. So we can utilize this; it is kind of like ShipChem [see below]." The CEO, Mowen adds, is a former Eastman employee.

Yantra A business process application for transaction management. Mowen turned to Yantra to build an extraction layer, which transports information between different types of databases, for Eastman.com. "We have a large product with them right now on Eastman.com. So we had specific things in mind, and we just think that the Yantra folks had a brilliant management team and great set of capabilities."

LAUNCHES

In addition to its investments, Eastman has also launched three ventures.

Asia Biznet A consultancy aimed at assisting institutions and companies in the chemical and chemical-related indus-

tries to manage investments that provide e-business solutions in the Greater China region.

PaintandCoatings.com An online marketplace for the paint and coatings industry. "Our largest business as a company is in paint coatings. We doubled the size of that business from \$600 million to more than \$1.2 billion in the last three years, and so we're doing ventures with VerticalNet to facilitate our participation in the paint and coating business."

ShipChem.com A virtual logistics provider for the chemical industry, which is already up and running with a few modes of transportation. "ShipChem is one of our ventures that we incubated and moved out as a company. Their first customer is our whole logistics spend, which is \$400 million a year. They can then go to others and say, 'We were successful with our first customer, we'd like you to join.'" Eastman spun off ShipChem in February 2000.

—B. Worthen



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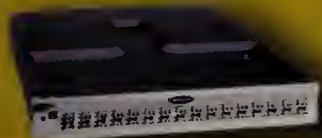
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A DILIGENT TIP

Don't forget—you're buying the vendors too

If you decide to try your hand at venturing, you will need to be careful. First Data Corp. CIO Guy Battista and his team have spent years refining a method for evaluating the companies that cross their path. They get down in the nuts and bolts, not just looking at a company's hardware and software, but also human resources and finances.

But the most important—and most overlooked—part of the evaluation process, says Battista, are the contracts a potential target has with its vendors. About a year ago, while evaluating a credit card company, which he declines to name, he found a rather remarkable problem. "The third-party software that they bought could only run on one computer in one location," Battista says. "If I had wanted to move it to another location—or even another computer—I'd have had to pay a prohibitive fee.

"So we walked away from it," he says.

Now, a year later, he says the company is out of business.

—B. Worthen

it," he says, "because it didn't affect your P/E ratio or any of the fundamentals of your company. You just had a windfall of \$100 million bucks in a single year. Period."

Northwest's recent divestiture of its interest in U.K.-based telecommunications company Equant illustrates this point. Despite the \$28 million profit Northwest earned by its February 1999 sale of its shares in Equant, which it helped found in 1995, Northwest's stock held steady. Indeed, following its sale of \$58 million in Priceline.com stock in February 2000, on which Northwest CIO Parker says the company made a several-million-dollar profit, the airline's price per share hit a 52-week low.

"While we love to see those payouts," says Parker, "we enter ventures for different reasons. We are primarily looking to influence their solutions to help enhance the airline."

Instead of chasing the pot of gold, agrees Koehler, the CIO should have a strategic map that identifies where he's trying to take the company. Whenever a company comes to his attention, he should first ask if it fits the map.

"The companies that are winning the game today," says the Feld Group's Koehler, "are the ones who have taken

chances on emerging companies."

Helping their companies take that step, becoming, in effect, a VC for the enterprise, is a big leap for many CIOs, especially those who came up through traditional IT departments. "There is a whole new set of skills that I wasn't expecting when I took this job," says Parker. "Making an investment is primarily a deal and not a technology project; you

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have to put your business hat on, and specifically put your deal maker hat on."

With the right team and the full support of the CEO, a CIO can be an agent of change and lead his company into the future. FDC's Battista remembers the days when some executive or salesperson would "open the door, throw something in and say, 'Oh, we bought this.'" Now, says Battista, "I am constantly out there looking for businesses." **CIO**

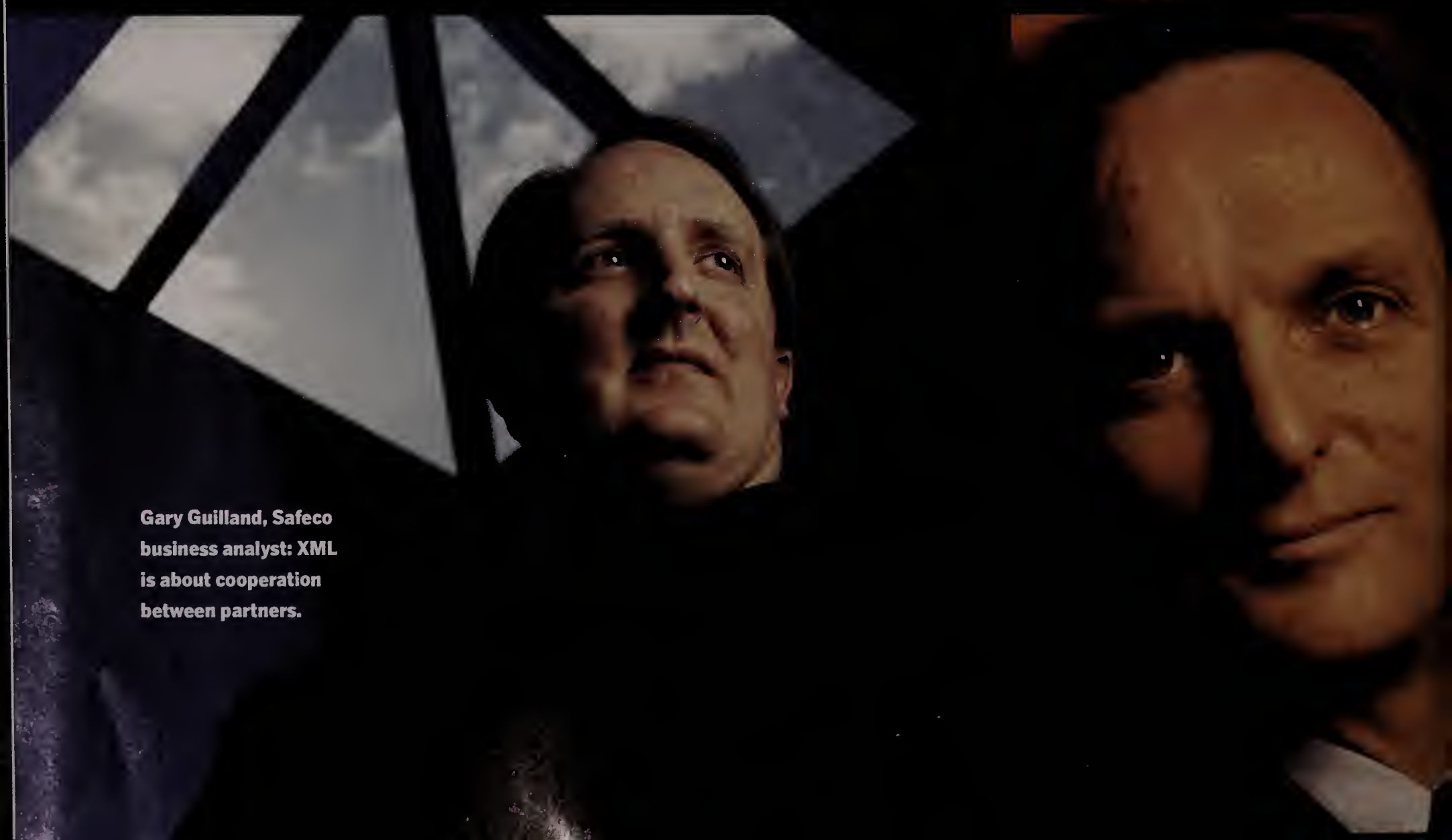
Staff Writer Ben Worthen would love to hear about your investment strategies. He can be reached at bworthen@cio.com.

the hype stuff

BY SCOTT BERINATO

Will **XML** be
the ultimate
platform?
Or will it be
the next EDI?

**Gary Guiland, Safeco
business analyst: XML
is about cooperation
between partners.**





I hear it's going to cure cancer," says Tim Bray, its cocreator.

"It's going to do my dishes, I hear," says Anne-Marie Keane, Staples' vice president of B2B e-commerce.

Behind the flip jokes lies XML—a syntax that underpins a growing list of more than 300 nascent data standards. MathML, for instance, will make it possible to manipulate advanced mathematical equations on a webpage. Spacecraft Markup Language standardizes databases that operate telemetry and mission control. And then there's MeatXML, a comical name for a serious effort to create a universal meat and poultry supply chain standard.

With XML going in so many directions at once, you can't blame CIOs for being confused. The hyperbole often makes XML sound like a salve for all pain. Even

worse, the vendor hype is overwhelming. CommerceOne, for example, boasts that British Telecommunications will cut purchase order processing costs by 90 percent using XML-based procurement. Software and service provider JetForm claims developers can write programs in days that would have taken months without XML.

Finding the truth behind the tales takes some digging.

Technologically, XML is a giant leap for IT. It can drastically reduce development time while making data transfer over the Internet simple. If nurtured properly, it may even become the ASCII text of online business—ubiquitous and assumed. Or it could become the next EDI, fractured under the pressure of vendor self-interest. One thing is certain: For XML to reach its full potential, CIOs will have to take an active role in forcing their partners, their vendors and even their competitors toward a radically more open computing model than what exists today.

That's no small task. But some companies have been willing to take it on by implementing XML now rather than later. We found three such brave souls putting

Alistair Duncan, Visa International senior vice president: XML is about integrating legacy systems.

Reader ROI

Discover how companies are using XML to create business solutions today
Learn what CIOs must do to maintain the value and openness of XML

Steve Morin, TAC Worldwide CIO: XML is about campaigning for standardization.

PHOTO TOP BY JAY BLAKESBERG; BOTTOM LEFT BY DAVID PERRY; BOTTOM RIGHT BY JAY REED



St. Paul, Minn., and member of the XML registry repository working group, which is trying to set up a public network containing every XML schema. "But it's getting to the stage where people are saying, 'Give me more solid evidence. Put some substance behind this technology.' It's time to look at how we can adopt this stuff."

VISA: LEARNING TO SHARE

XML-hyping vendors throw around terms such as *frictionless data exchange* when they talk about their products. But Alistair Duncan thinks differently. "Everyone is talking about XML. But when you come into our industry, many people are still on legacy systems that aren't going away—and you have to accept that."

For Duncan, senior vice president of commercial products at Visa International in Foster City, Calif., XML is as much about dealing with legacy systems as it is about supporting the latest technology. And there's a lesson in how he's approached XML: deliberately, in context and not at all like it would solve all his problems overnight.

Duncan was charged with building an application to itemize charges to Visa corporate cards. This would allow corporate customers to automate parts of expense

Many people are still on **legacy systems** that **aren't going away**—and you have to **accept** that."

—ALISTAIR DUNCAN, SENIOR VICE PRESIDENT
OF COMMERCIAL PRODUCTS, VISA INTERNATIONAL

XML to work, each in one of the three areas most agree the technology will first permeate:

Business-to-business data sharing, where Alistair Duncan of Visa International has built his own XML vocabulary for sharing corporate credit card information.

Content management, where Gary Guiland of Safeco is using XML but is hardly ready to coronate it as the future of computing.

Application-to-application integration,

where Steve Morin of TAC Worldwide sees XML revolutionizing the human resources industry—if 90 competing vendors can agree to cooperate.

Despite the qualifiers, all three remain confident in XML's prospects. "There's a lot of optimism," says Joe Dalman, senior vice president and COO of Tie Commerce in

reporting by electronically transmitting the itemized charges to the correct cost centers. It would also give Visa more detailed data on its corporate customers' spending.

He identified thousands of potential data elements—such as hotel charge, hotel tax, state tax and meal charge—that he wanted to capture. But rather than XML, Duncan

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looked first to EDI. It fit the need technically, he says, since EDI development tools were mature and proven.

Soon, however, Duncan decided to take a chance. "We had gone quite far in putting these items into EDI format," he recalls. "But eventually we saw the market moving toward XML."

A year later XML is working with several hotels and car rental companies now able to inject itemized charges directly into Visa and Visa corporate card subscriber systems.

But Duncan says implementing XML wasn't easy.

"People are still talking over XML standards, so we had to make some definitions ourselves," Duncan says. "We developed a reasonably generic XML vocabulary called the Visa XML Invoice Specification, and we had to hope external companies would implement it."

Visa then spent time and money convincing reluctant merchants and customers to adopt Visa's XML. It worked, as more than 2,000 companies have downloaded the specification.

Then Visa had to invest in training. The company had to work directly with merchants to make sure they properly integrated XML. However, some partners—such as the air-travel industry—aren't yet ready to use it, preferring instead to use their own existing standards. Visa simply can't fail to include airfares in its detailed charges, so Duncan had to build XML-to-whatever-legacy-system conversions. "You can't afford to be dogmatic and tell people they must use XML because it's so great," Duncan says. "We had to invest in conversions from their proprietary formats. And that costs money, and it slows things down."

Those conversions also make XML more complicated than the vendors claim—and it's

only getting more complex. Already XML has spurred XSL, XSLT, XHTML, XLink and XPointer as adjunct standards. (These standards create such things as formats for hyperlinks and style sheets that define where and how XML objects appear.) The encroaching complexity has even spawned a backlash at sites such as XMLsuck.com and The XML Lobby (xmlbastard.com).

Duncan dislikes the trend toward complexity but accepts it as a reality of working in a legacy world. And he still thinks XML is better than any of the alternatives out there—but it's not as "frictionless" as some of its purveyors claim. "That could only be true if you're starting out totally new," he says. "But you know business. When does that happen?"

SAFECO: CONTENT TO MANAGE

Business analyst Gary Guiland compressed a two-day process into 90 seconds. He used XML in conjunction with other tools to accomplish the task, but he's giving the technology little credit.

Guiland's business is surety bonds—his company guarantees transactions between other companies—for Safeco in Seattle. Traditional requests for surety bonds involved paper applications, signatures, photocopies, the post office and manual data entry—a process that took as long as two days to execute. The grocery application, Guiland called it: high volume, low margin; but you have to do it. The only way to make it better, he thought, was to automate this necessary evil, which meant managing huge volumes of content.

Guiland contracted software vendor JetForm in Ottawa, which had built its own XML vocabulary for forms called XFA (XML forms architecture). Together, they marked up the surety bond application with XFA and stored it as a database of XFA objects. They then built a website that guides applicants through the application. Each question represents an XFA object: name, address, bond type requested and so forth. Once complete, the application cobbles together the objects into the proper forms.

XML Assumptions vs. Realities

Assumption	Reality
XML is a panacea.	It's a significant step beyond things like CORBA and EDI, but it's immature, still evolving and will not be everything to everyone.
With my applications XML-enabled and my partner's applications XML-enabled, we should be able to communicate easily.	Possibly. But first you all have to agree on a specification. And even when industry standards would make more sense, many vendors are building their own XML specs and asking users to comply with that.
Since XML applications communicate easily, I should start XML-enabling all my applications.	Don't get ahead of yourself. Enabling key XML applications alone will take a significant capital investment and myriad strategic decisions.
Since XML is a specification, all applications that use XML will work together.	Not all XML-based specifications work together, just as not all words made from an alphabet are part of the same language. Consensus is key.
XML is a language.	XML is actually a syntax, like English grammatical rules. You can't write actual code in XML, something you can do with a language.

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Those forms then appear in the user's browser, ready for printing, while a copy goes to a back-end mainframe, where they're again translated for storage.

The translation tools took two weeks to write. Full implementation of the application, according to Guillard, took just about a year.

Guillard says the new application cuts the post office and the data reentry out of the process, reducing execution time from days to minutes. And costs stayed low because XML development is relatively inexpensive, especially with a preexisting vocabulary such as XFA.

Still, Guillard hasn't deified the technol-

ogy. "All of our objects are XML based, but the application is king," Guillard says flatly. "It really was happenstance that XML was the technology back there. XML didn't make this happen as much as the [design of the surety bond] application did."

Heresy? Not really. Even Tim Bray, one of XML's fathers, says CIOs should do, to a large extent, what Guillard has done. Ignore XML.

"Assume it will be there," Bray says. "Most vendors are putting it in their software. Ignore them. XML is the easy part." Then, he says,

use the time once spent building tedious one-to-one supply chain connections to instead develop reliable business processes. Guillard could be a poster child for this kind of XML temperance. He poured all his efforts into the surety bond application, the Web interface, the forms-building logic and the translation tools. At the same time, he says he probably couldn't even define XML accurately.

Whether he could define it or not, Guillard isn't done with XML. In addition

XML **didn't** make this happen as much as the **application** did."

—GARY GUILLAND, BUSINESS ANALYST, SAFECO



to using it for other parts of the surety bond process, Guillard wants to get other companies in the insurance market to integrate XML standards, which is a diplomatic—not technical—task. "In the long run, the real value is working with our partners, getting them to convert systems according to the standard," he says, referring to the insurance industry's effort to standardize an XML vocabulary, called The ACORD (Association for Cooperative Operations Research and Development) XML standard.

Guillard also spends time rebuffing what he considers extraneous XML development. When pressed on the possibility of using XML-enabled analytic tools to mine his data, Guillard balks. "It's always nirvana when vendors pitch this stuff, but you know it's never nirvana getting there.

"We're aware of XML," Guillard adds. "We're not driven by it."

TAC WORLDWIDE: HOW TO BE A PLAYER

In the absence of XML, as Steve Morin now refers to the recent past, TAC Worldwide built one-to-one connections with its part-

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ners. Custom FTP links, custom code and “sometimes a lot of grunt brute force” helped the \$1 billion professional staffing company find and assign temporary or contract talent to its subscribers.

Now in the presence of XML, Morin, CIO of TAC in Newton, Mass., thinks he can cut recruiting time by one-third and slash his development chores in half—at least.

Morin is leaning on XML to automate huge parts of the recruiting transaction by creating a common language. His database will use this XML vocabulary, as will his clients’ request forms, partners’ procurement applications, job posting boards like Monster.com and even résumés.

Then, when a client asks for a Java programmer with five years’ experience, Morin’s databases will know precisely what that request means, automatically search for the best matches and eventually send a list of prospects to the client along with contracts ready for signing. With just a few months of development, Morin says the HR industry could have a network of integrated applications more powerful than any EDI network, and completely open. He believes XML can make the Internet seem like a mildly inter-



The best thing they can do is make sure when standards come out that they **plug and play.**”

—STEVE MORIN, CIO, TAC WORLDWIDE

esting prologue to a real B2B revolution.

Of course, there’s a but. For all of that to happen, everyone in the human resources industry must agree on a standard XML vocabulary.

To that end, HR industry companies formed the HR-XML Consortium. Eventually—2002 at the earliest—HR-XML will include elements for about 20 standard HR functions, such as staffing exchange, payroll transactions, compensation and even background checking. Morin’s a charter

member of the group. His bosses saw the consortium as great marketing, demonstrating TAC as an industry leader. Morin, meanwhile, joined to exert influence on the standard. He just didn’t know that it would become a full-time job.

For Morin, XML started as a technical boon but has turned into a full-out diplomatic grind. The challenge is getting some 90 companies to settle on the thousands of elements that will compose HR-XML. That’s quite a chore, especially when you

consider that e-business heavyweights such as Ariba and CommerceOne chose not to agree on XML tags as simple as a product’s SKU number.

“It can get pretty political,” Morin notes. “Frankly, there’s a lot of dialogue now we don’t even get involved in. So we let it go back and forth and wait for the vote, evaluate the proposals, and then we’ll get involved.”

Many industries are experiencing that same political process. XML.org lists 16 projects in the financial sector alone, some complementary, some competing. And XML’s elegant openness isn’t always virtuous enough to make vendors cooperate.



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Take Visa, flush from Visa XML Invoice Specification's success. A spokeswoman said the company wouldn't cede its internally developed vocabulary for a vendor-neutral industry standard. As a result, hotels might one day be burdened with an XML standard for every credit card company and the translation tools to go between them. To compensate, opportunists are already creating tools that translate one XML vocabulary into another.

Visa's Duncan calls the translation process nearly trivial. But while that's nice for developers, TAC's Morin says it creates a management nightmare.

If vendors don't agree on vocabularies, Morin says he'll find himself spending his time downloading the latest vocabulary and all the subsequently required translation tools. "That's still creating pain," he says.

"There needs to be some consolidation of vocabularies," adds Charles Dietz, an XML specialist at Metropolitan Life Insurance Co. in Bridgewater, N.J. Ironically, he blames the proliferation of dialects on

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XML's ease of use. "XML is frankly so simple it's easy to create a vocabulary. That's good but also bad."

HR-XML has tried to rein in all development under its one umbrella, but nothing would stop Morin or any other member from also creating his own vocabulary.

Despite a cutthroat reputation, Morin says everyone in the HR industry seems to be cooperating. But he admits it's a leap of faith, and a hard one to make.

HR-XML faces another big hurdle too: Software makers have to agree to build support for one standard and refrain from adding proprietary extensions—a level of cooperation that didn't materialize with EDI 30 years ago.

"We're asking people to practice truly open computing," Bray notes. If it happens, he says, "It would be an unmitigated win for CIOs. For vendors, the benefit is not so clear."

That's why Morin says XML's success has nothing to do with how well he knows the specs, but rather its success rests with CIOs taking charge and prodding vendors into openness.

"Oh yeah, we push them," Morin says. "We work with both Microsoft and Oracle, and we give them both very strong views of how they need to [stay open]. They need to realize that neither of them will win the entire battle. The best thing they can do is make sure when standards come out that they plug and play."

For their part, Microsoft and Oracle have both told Morin they would support HR-XML and not extend it. "They are saying all the right things right now," he says, but he admits to still having long-term concerns.

In the meantime, Morin is carrying out his pilot program—a simple application integration between TAC and an external partner, using XML to automate transactions. He's testing Microsoft's BizTalk server and Microsoft and Oracle databases, both using parts of the embryonic HR-XML vocabulary.

"There's the potential for XML to be for e-business transactions what HTML was to Web publishing," Morin says. "There's also the potential for it to be the next EDI. There's a lot of potential energy." **CIO**

Senior Writer Scott Berinato never wants to hear another XML acronym again, but he does want to hear your opinions on XML at sberinato@cio.com.

BikeXML's Wheels Come Off

Creating an XML standard can be a long, uphill ride

Leslie Bohm tried to harness XML's potential. He immediately recognized how applications using XML might advance the B2B supply chain in the bike business, where he's a highly regarded consultant.

Bohm says he sunk hundreds of thousands of his own dollars into recruiting the five major cycling manufacturers and hundreds of retailers for a supply chain that would use its own standard XML vocabulary, BikeXML, as its underpinning. BikeXML.org was launched, along with Bikecommerce.com, its B2B exchange website. Bohm envisioned unprecedented efficiencies in the tire-and-pedal business, saving everyone astonishing chunks of money in order processing and shrinking turnaround time while ensuring smooth inventory levels.

Both websites went into hibernation in February. "They didn't get it," Bohm laments. "They could see how it simplified the supply chain, but we had a hard time with the politics. And as soon as it gets to talk of opening their platforms, they flinch. These IT departments can be empire builders. It's a real phenomenon; the executives understood it, but when the IT department had to compromise on the standard and the website, it fell apart."

Bohm thinks another BikeXML is two years from reality now—more if the economy continues to sink.

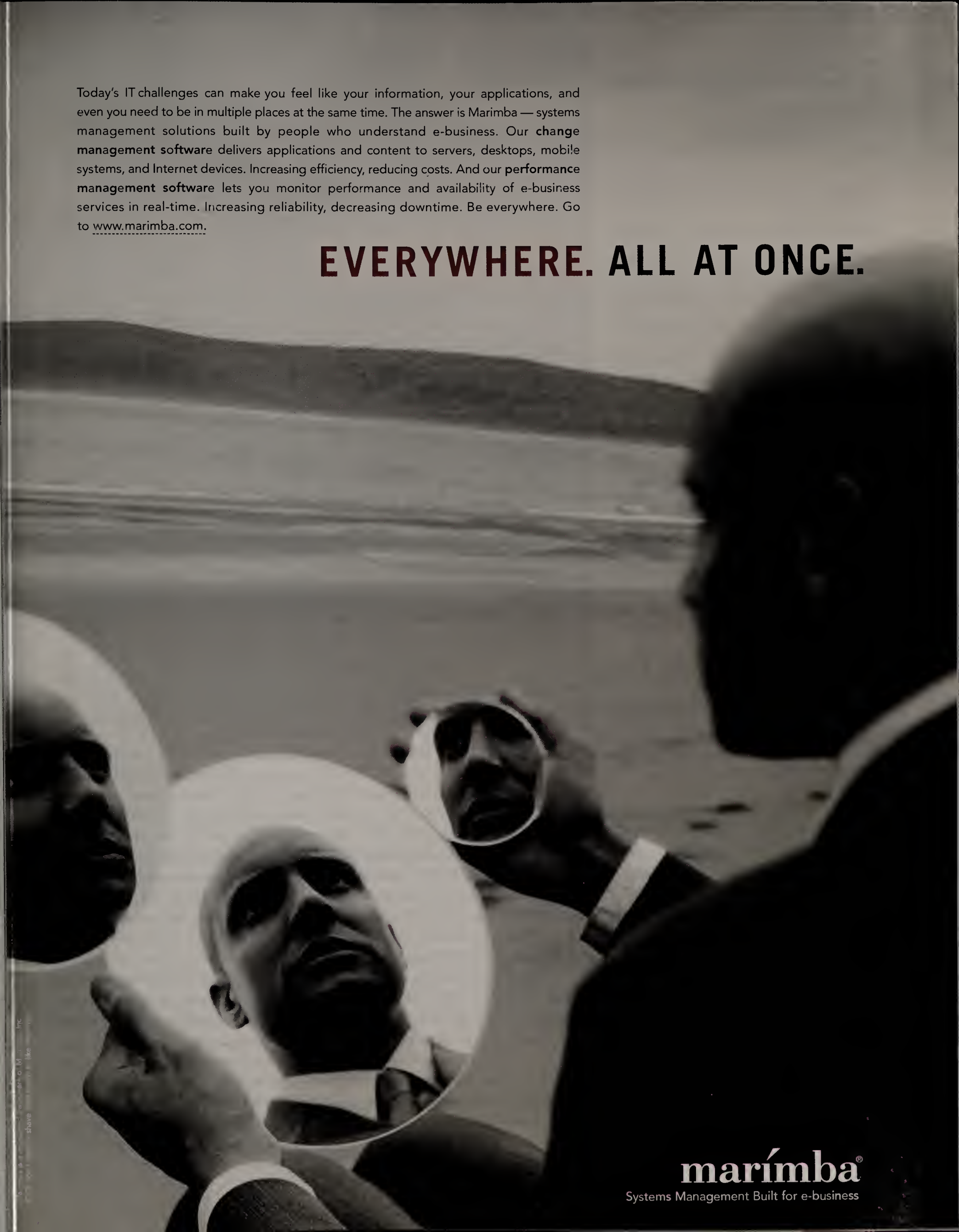
He is not short on advice for CIOs, either. "I would just say this: It's not about the technology. It's about the psychology. The technology's not simple, but the psychology of XML dwarfs the technology.

"You bet I'm disappointed. I feel like we missed it, the chance to really leap forward."

—S. Berinato

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A virtual, Web-based call center helps this custom doll maker find made-to-order agents

BY ESTHER SHEIN

Hello, Dolly!

The Company: My Twinn

Founded 1992 **Headquarters** Englewood, Colo.

Call center agents 25 to 400, depending on the season

Mission Create one-of-a-kind dolls personalized to look like their owners **Target customers** 30- to 50-year-old women with children between the ages of 4 and 12

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WHEN CUSTOMERS CALL My Twinn's toll-free number, they're toying with plunking down some relatively serious cash for a doll. Not just any doll, mind you. But a doll that's custom-made to look just like their child—right down to the freckles. So it's not surprising that these customers have a lot of questions. And that's why My Twinn is delighted to have agents like Kris Burns, a college-educated mother with five children of her own, handling the calls. The company is able to get such agents because it has outsourced its call center to Alpine Access of Golden,

Colo., whose 430 agents work out of their homes on flexible, and often part-time, schedules.

A few years ago, Englewood, Colo.-based My Twinn decided to outsource its call center operations because the seasonal nature of the doll business made it hard to justify the overhead of an in-house call center. "When you go from 25 agents to 400 [during the holidays], the effort to recruit, hire, train and provide the space and capital needed to do all that makes it more cost-effective to outsource," explains Gail Hickert, vice president of customer service and sales. "You don't want to have a facility and equipment and space to use them only three or four months out of the year."

But after working with two separate outsourcers, Hickert grew fed up with outsourced call centers' high turnover rates, which meant that My Twinn's calls were often going to new reps who weren't very familiar with the products. What's more, the average call center employee—a woman in her early 20s who probably hasn't been to college—wasn't exactly brimming with empathy for My Twinn customers. And the typical My Twinn customer—a female in her late 30s or early 40s with children, often with a college degree—needs to be convinced her order is in good hands before she'll pay up to \$225 for a custom doll and matching outfit for her child. "The labor force could not relate as closely to the customer as



Using work-at-home call center agents lets My Twinn hire a demographic population that “more closely reflects our customer.”

—GAIL HICKERT, VP OF CUSTOMER SERVICE AND SALES, MY TWINN

her work reflects a positive attitude that translates into a more pleasant experience for My Twinn’s customers, she says.

Burns, for example, is clearly happy with the work-at-home model. She has worked for Alpine Access from her home in Highlands Ranch, Colo., since September 1999. A customer service agent and supervisor, Burns says the Alpine Access motto of “family first” makes it a good company to work for.

“Working out of the home isn’t going to work if you want to supervise your children,” says Burns, whose five kids are 12 and under. “But this enables me to be at home when my children get home from school. And without the commuting time, I can still put in a full day.”

The fact that Alpine Access works around the call agents’ schedules “makes for much happier, motivated employees,” says Burns. Happier employees tend to stick around longer, so My Twinn has the benefit of a seasoned staff and fewer resources that must be devoted to training new reps. Rockwood won’t disclose the average tenure of an agent at his company, which had been fully operational for 17 months at press time. But he insists Alpine Access’s retention rate is “much higher than any brick-and mortar-facility.” The number-one reason for turnover in call centers isn’t pay but schedule conflict, says Rockwood. And the virtual model allows Alpine Access to offer its employees greater flexibility than a traditional call center could.

you would like for customer relationship building,” says Hickert.

In Alpine Access’s home-customer-agent model, Hickert saw the potential to hire a demographic population that “would more closely reflect our customer,” she says. Following a successful two-month pilot with Alpine Access, My Twinn turned over all of its call center business to the outsourcer in June 2000.

More Qualified Agents

When Alpine Access launched in 1998 as a Web-based virtual call center, its cofounders, who had long been involved in traditional call centers, decided to upgrade the labor and hire more sophisticated agents who would be adept at using CRM technology, according to Steve Rockwood, cofounder and president. Using agents who don’t have the edu-

cation or background to be able to get the most out of CRM software is “analogous to using technology to build great fighter jets but then putting high school graduates—or dropouts—behind the controls,” he says. “We’re bringing fighter jet pilots to handle this fighter jet technology.” Alpine Access agents have to be technologically savvy, smart and friendly, and “have a wonderful way online and over the phone,” he says. In fact, the company requires applicants to audition for the job by calling in to leave a message. Alpine Access then digitizes the resulting “voice prints” and measures their tonality as a way to gauge the applicants’ friendliness, Rockwood says.

Hickert is convinced she’s able to get higher caliber agents by tapping into the pool of workers who prefer to work from their homes. An agent who is satisfied with

"Obviously, the longer you have call center reps in place the better you are able to serve your customers," says Joanie Rufo, a research director at AMR Research in Boston. The average turnover time for traditional call centers is 18 months, she says.

As with any work-at-home model, figuring out how to keep agents motivated is an important consideration, says Rufo. "There are certain personalities that thrive when working from home, but conversely, some people do better in a work setting." To keep tabs on agent productivity, Alpine Access monitors its agents over the phone and electronically. "If I need to, I can actually see what the agent is doing online," says Rockwood. "[Agents are] home alone, but they're never alone. We're always there to monitor and support them." The company also conducts all of its training online; up to 20 agents can simultaneously log on to Alpine Access's Web training center to participate in live interactive training sessions.

Hickert also can supervise My Twinn's virtual call center on the Alpine Access website. There she can set measurements that let her monitor the agents and track things like number of abandoned calls, average call length and the percentage of calls that are handled within the parameters My Twinn has agreed on with Alpine Access. For example, 90 percent of the order calls need to be answered within 120 seconds or less, Hickert says.

The Virtual Call Center

So how do at-home agents report to work at My Twinn's virtual call center? Each agent uses two phone lines. The first is for Internet access to connect to Alpine Access's website. Through the site, agents log on to the appropriate client's CRM or order processing system so that all customer data the agents collect goes directly in to the clients' databases. (Agents handling My Twinn calls, for example, use My Twinn's Ecometry system from Smith-Gardner to log orders.) Using the second phone line, agents dial in to a master switch that puts them into Alpine Access's virtual call center, through which phone calls are routed. Then reps enter their name and pass-

word to access a particular client company.

Burns, who works 35 to 40 hours a week, says the Alpine Access Web center is intuitive, and its agents have plenty of support at their fingertips if a call needs to be escalated. "All

the resources and tools have been placed on the website, and any question asked of us can be answered," she says. "That customer doesn't even know we're working at home and not at a brick-and-mortar company.

EXPERT ANALYSIS BY WENDY CLOSE

The Future of Virtual Agents

Fewer than 5 percent of call centers use work-at-home agents, even though DSL and cable modems have made having virtual agents feasible. Yet while technological barriers are diminishing, other concerns have kept most call centers from jumping on the at-home agent bandwagon. Technology costs have come down, but companies continue to conclude that on a cost-per-transaction basis, using virtual agents is not cheaper than centralized operations. Also, most companies prefer centralized operations to streamline administration and maintain control. (It's easier, for instance, to handle technology setup and maintenance when all of your agents work under one roof.) What's more, going into people's homes represents a liability risk for call centers.

That said, any technique to reduce agent turnover is worth investigating. My Twinn's 88 percent reduction in agent turnover is remarkable. With overall attrition averaging 15 percent per year, agent retention is one of the most challenging problems—if not the most challenging—for contact centers. For the average call center, 71 percent of the cost per handled call (which averages \$6.38) is personnel-related. (Operations account for 54 percent and administration for 17 percent; capital and communications make up the rest.) Reducing turnover therefore not only improves customer service, it lowers costs because it cuts back on the extra training and management resources required to bring new recruits up to speed. It's impressive that My Twinn has been able to improve its close rate and decrease its number of escalated calls. If My Twinn has been able to cut its overall costs (maybe not cost per transaction), particularly personnel costs, then the strategy is really paying off.

The greater the need for highly skilled agents (such as those with technology expertise), the better the business case for virtual agents. The virtual strategy is worth pursuing if you need highly skilled people. But most call centers remain focused on keeping the cost per transaction down, and the perceived administration and control issues that come with using work-at-home agents make most call center managers uncomfortable. So in the future, instead of virtual agents, we are more likely to see clusters of agents in remote offices where the demographics match the client's needs (for example, low labor costs, high work ethic).



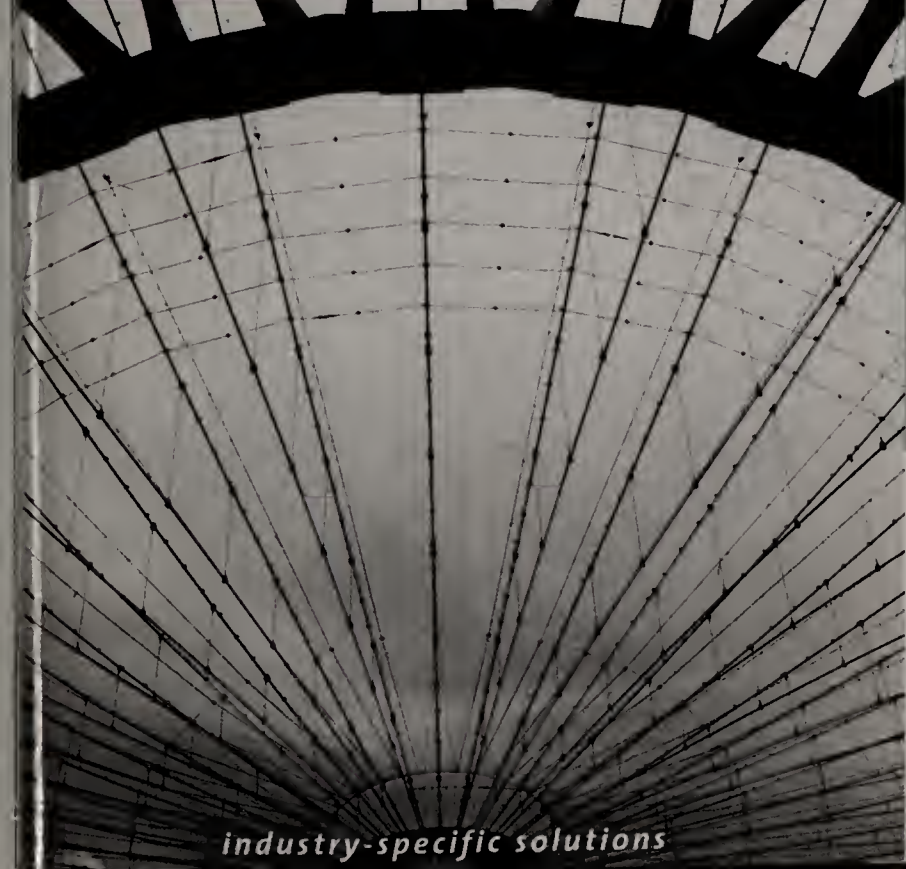
Wendy Close, a CRM research director at Gartner, is a CRM generalist with 10 years of experience. She can be reached at inquiry@gartner.com.



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"When I log on, I'm scheduled for one customer at a time," Burns adds. When it's time to field calls for another client, she hangs up, calls in to the same switch and enters a different password to access that company. Burns, who is cross-trained to work for six companies, monitors agents for My Twinn. (Client companies represent a range of industries, including pharmaceuticals, financial, travel, copy and fax machines, and health care.)

Better Relations, Higher Sales

My Twinn has ample evidence that switching to the virtual call center model was a smart business move. In 2000, Alpine Access agents converted 30 percent more inquiry calls into orders than agents in the brick-and-mortar call center had converted in 1999, according to Hickert. She also says that agent turnover decreased 88 percent, allowing My Twinn to save considerably on training costs. What's more, the company had 90 percent fewer escalated calls, letters and e-mails from irate customers in 2000 than it had in 1999. Hickert is so pleased, she's planning to have Alpine Access take over handling My Twinn's e-mails as well.

But that's not to say that every last call is now managed flawlessly. Devin Golden of Belmont, Mass., says the My Twinn call agents he dealt with were courteous and tried to help—but he repeatedly requested catalogs last holiday season to no avail. Although he got a 10 percent discount when his third call was escalated to a supervisor, he didn't get a

catalog in time to place a Christmas order.

Hickert calls Golden's experience "unusual" and says the company bends over backward to handle as many customer requests as it can, even at the height of the holiday season. And overall, she's happy with Alpine Access. "Our revenues per labor cost have significantly increased because these people close more sales and they relate better to the customer," she says.

Agents are likely to relate well to customers because, according to Burns, the company tries to find people who have a history in the field its clients are in. She says that of all companies she's worked for as a call center agent, she relates most to My Twinn because of its products, and the fact that her children are at the age where they play with dolls. "When you can relate to anything you can sell, of course you're going to sell it better," she says. "Most of us who work for My Twinn have children."

And if the experience of customer Kim Kill, a substitute teacher's aid in St. Marys, Ohio, is typical, agents are, in fact, relating well to customers. Kill ordered a doll in 1999 and has since placed three more orders for accessories and matching outfits for her daughter. She says she found that everyone she has talked with at the company "seems to know the needs of little girls and how they want everything just right."

Says Kill: "I had asked for a specific dress, and they were out of stock, and the [agent] was very sincere and said how sorry she was

and what a cute dress it was, and how they were getting lots of orders for it." Kill notes that even when she had to change a previously placed order for doll accessories recently, there was no problem. "As far as changing my order and getting a different dress, it couldn't have gone smoother and everything I received in the mail was correct," she says. "I felt really bad calling back, but they were very pleasant."

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Without commutes, cubicles or dress codes to contend with, the agents answering My Twinn's calls have less cause to be unpleasant than the typical call center agent. Alpine Access employee Burns says she looks forward to working because she can literally crawl out of bed and go into her office. "It's a wonderful job. I have no intentions of going anywhere. I'm able to juggle five children, a 40-hour workweek and all the home responsibilities, and not ever have to leave. It just makes for a happier, more content work environment. It really comes across in my voice." **CIO**

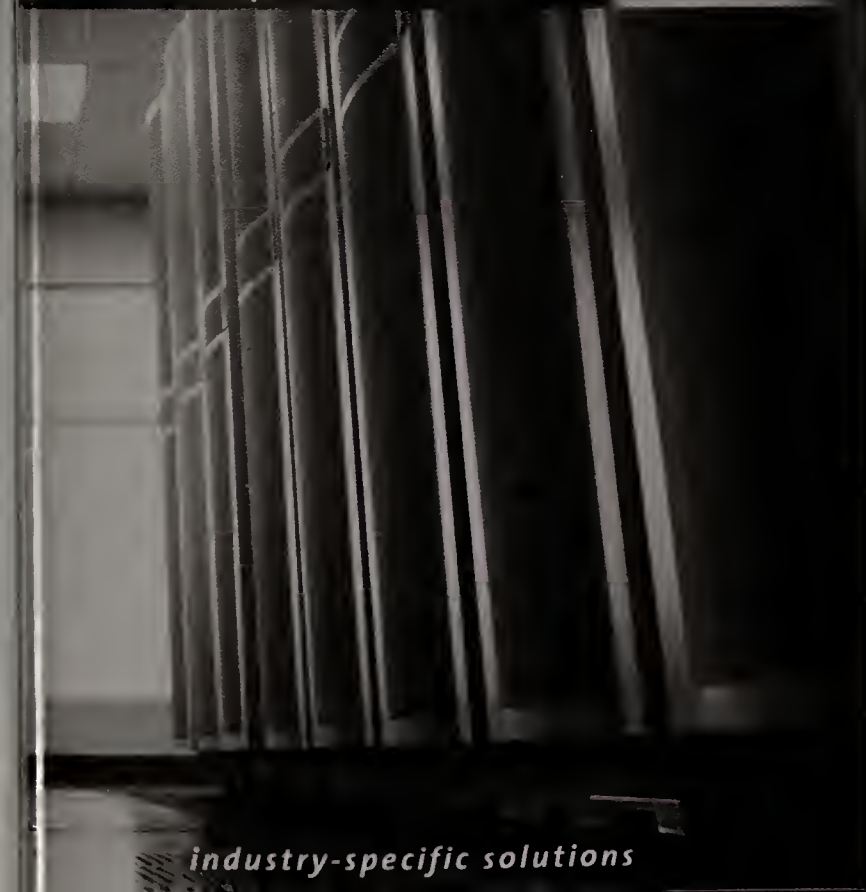
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ERP doesn't have to cost an arm and a leg and take several years. Here's how midmarket companies get it fast and cheap.

Faster, Cheaper ERP

BY LEE PENDER

JAMES MCCULLOUGH REMEMBERS back when he had a \$500 million IT budget and teams of IT professionals. By last year, though, all of that was a distant memory.

McCullough, the former CIO of Delta Air Lines, found himself reshaping his new company's IT infrastructure without the benefit of a large budget or staff. As CIO of eCompanyStore, an Alpharetta, Ga.-based company that builds online stores to fill promotional product needs for its clientele, he had to figure out how to deploy big-company technology—specifically, ERP applications—without spending big-company money.

"We knew we were going to have to go [the ERP] route if we were going to become

scalable," McCullough says. "We didn't want to come back in 18 months or two years and say we can't handle [transaction] volume."

McCullough decided to explore a relatively new option in enterprise applications: fast-track ERP. Fast-track ERP gives smaller businesses (with revenues between \$200 million and \$500 million) access to functionality similar to what their Fortune 500 counterparts have had for years. When all goes well, fast-track ERP implementations are measured in thousands of dollars instead of millions, and months instead of years. The vendors promise up-front, guaranteed agreements on schedule and price, fully functioning applications and a lot fewer headaches than traditional ERP.

The fast track isn't without its speed

Reader ROI

- ▶ Learn how rapid ERP deployment has evolved as an answer for midsize companies
- ▶ Determine whether your company is suitable for fast-track ERP
- ▶ Evaluate the differences between traditional and fast-track ERP implementations



James McCullough,
CIO of eCompanyStore,
needed to implement
big-company technology
without spending
big-company money.

bumps, however. First, there is a greater need to stick to the plain vanilla version of the package, with as little customization as possible. There are also unexpected costs that pop up outside the scope of the fixed-price contract. Although they are simpler than their bigger brethren, the systems are still at the mercy of people—it's essential to manage expectations and resistance to change, and provide thorough training.

McCullough started down the fast-track ERP path with Walldorf, Germany-based SAP. He and his team of 20, composed of SAP consultants and eCompanyStore employees, installed the R/3 system with modules for materials management, func-

Wolfe attributed lost sales and costly inventory backups to a failed implementation of "new business processes" based on R/3. The Hershey dilemma wasn't the only ERP failure to cripple a company's bottom line, but the press it received made it a poster child for the consequences of botched ERP efforts and helped jolt ERP vendors into developing cheaper and easier applications (see "ERP Moves into the Fast Lane," Page 132).

Enter fast-track ERP. For the most part, fast-track packages are built like their older siblings, based on best-practices templates. SAP, for instance, now has 11 industry-specific templates for midmarket customers.

These templates are designed to maximize efficiency and minimize customization, based on the processes and applications that have proven most efficient. Smaller companies often have undeveloped or underdeveloped processes, so they're willing to take the advice of ERP vendors that have attempted to refine those processes. They can learn from the suffering of their larger counterparts. There is less room for change but at the same time, less room for error.

In fact, the biggest difference between traditional and fast-track ERP implementations is customization, or the lack thereof. Traditional ERP packages are often heavily customized, requiring consultants, time and money. The price tag on the doomed Hershey's project, for instance, totaled more than \$100 million, according to the company and press reports. By contrast, most SAP rapid implementations cost less than \$300,000.

The biggest difference between traditional and fast-track ERP implementations is customization, or the lack thereof.

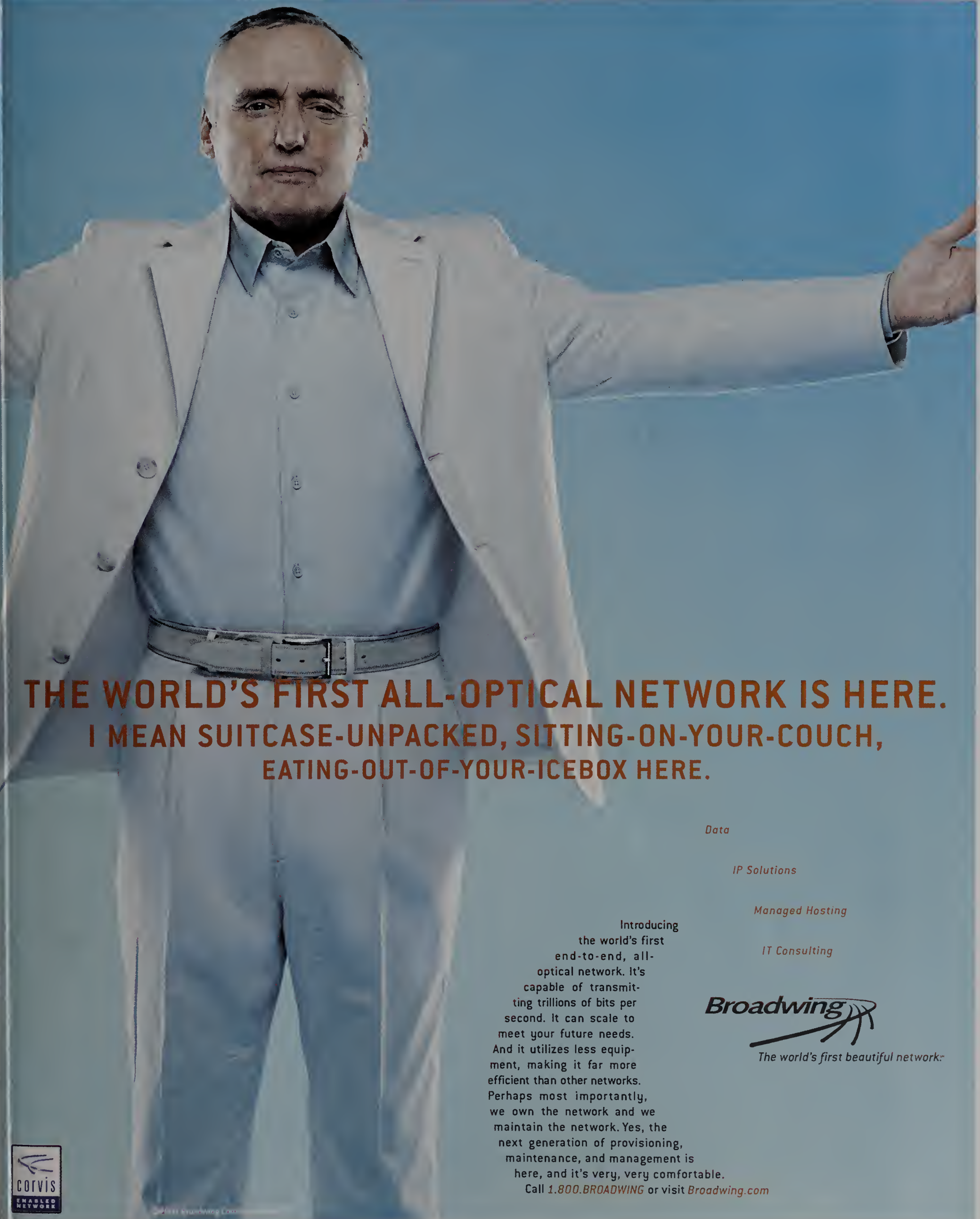
tion planning and finance, and an online store to replace the Pandesic application. They started in mid-December 2000 and applied the finishing touches in early January 2001. They did it without spending big-company money or time. "I'm sitting on an engine that's capable of taking our company into the stratosphere with the same suite of applications," McCullough says.

SURVIVAL OF THE CHEAPEST

NOT LONG AGO, THE ONLY THINGS "stratospheric" about ERP were the cost and implementation time. The stories are legendary—botched ERP implementations delaying critical product shipments, projects spiraling out of control and companies spending years and millions of dollars to set up systems. Hershey, the famous candy maker from Hershey, Pa., was among the companies hardest hit by ERP snafus. The chocolate maker reported a 19 percent drop in profits year over year in the third quarter of 1999. Hershey CEO Kenneth



Rick Schmidt,
*vice president of finance
and controller of NetRail,
says it makes sense to match
your business processes
to the software templates.*



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Deborah Joseph,
*manager of client service
programs at CyberCash,
had to explain how
the new applications
would make things
better, not just different.*

HOW VANILLA IS VANILLA?

IT'S IMPORTANT TO KEEP AN OPEN MIND WHEN considering changing business processes to fit ERP packages, experts say. Customizing packages should be a last resort, as the practices included in rapid-implementation plans are usually better than existing practices. That's a major break from traditional ERP, which often relies heavily on customization to integrate applications and processes.

"Given a choice between custom and preconfiguration, choose the preconfiguration," says SAP customer Rick Schmidt, vice president of finance and corporate controller at networking applications provider NetRail in Atlanta. "If you think you've developed some terrific process to do purchasing or sales contracts or whatever process you're doing, I've got a funny feeling that SAP probably has a good way for you to do it. You need to get in the mind-set that you just changed jobs, you are work-

ing for a new company, and you are learning a new way to do your job. It is the best practices that are key."

Gene Johanson, project leader for The Frank Russell Co., a Tacoma, Wash.-based financial services company, says changing processes helped his company shut down old systems that were ripe for creating errors. "It would be counter-intuitive to assume [PeopleSoft wasn't] doing best practices in HR," he says. "Why do we think that we know more than they do? It's caused some process change here, which is good. We've been able to effectively shut down all of the shadow systems."

Changing business processes isn't some-

thing one person can do unilaterally, though. Altering processes affects many people—all of them in some cases. It's important to involve everyone affected by the change in the decisions and discussions. Explaining that the new applications will make things better—not just different—is difficult but critical.

"If you're about to implement changes in your process—and if you have people who helped the process get to where it was—it's hard for them to step out of the box and look at it without the restraints they were working with [before the implementation]," says Deborah Joseph, manager of client service programs at CyberCash in Reston, Va. Her company recently underwent a rapid implementation of a CRM package. "Don't think about trying to replicate the bad process you had. Think about the ideal process you want to get to," she says.

KNOW THY CONTRACT

IT SOUNDS SIMPLE. THERE'S A FIXED PRICE AND a fixed timetable, but the devil, as always, is

Fast-track ERP contracts aren't like traditional ERP agreements. These contracts fix a time line, a price or both, in advance.

in the details. Fast-track ERP contracts aren't like traditional ERP agreements. These contracts fix a time line, a price or both, in advance. That's part of what attracts small companies to fast-track ERP in the first place. Fast-track companies often have spending requirements that call for such up-front agreements.

When Johanson's company needed to upgrade an HR system that was failing under the weight of integration leaks and overcustomization, company executives balked at the price of ERP. "People choked a little bit on the price," Johanson says. "We were considering the sale of the company to a number of different types of financial

A close-up, low-angle shot of a hand holding a glass bottle, pouring a stream of gold coins. The coins are in motion, creating a blurred trail as they fall. The background is dark, making the gold coins stand out.

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organizations. We didn't want to spend money on HR before selling." So Russell, which did eventually sell to Milwaukee-based Northwestern Mutual, made a deal with San Francisco-based PeopleSoft for the rapid implementation of an HR system.

Johanson says working through his company's contract was an eye-opening experience. The process of hashing it out was more difficult than he had expected. He says to remember the vendor is basing its fixed price on the time it will take to implement the applications. The actual cost of software is very low. In this case, time is literally money.

The project planning process, therefore, becomes more important in a fast-track setting than in a traditional ERP setting. The fast-track contract guarantees both what the vendor will give and what the buyer will get. There is little room for application customization with the fast-track route. Companies have to know what they need

and make sure they bargain for it up front. The vendor will then be able to base its implementation plan on those decisions.

"[The price] was a guarantee based on the deliverables," Johanson says. "The way they can do a fixed bid is they say, 'This is what we'll do.' They're basing their number on how much time they're going to have to spend on this." Again, the more an implementation sticks to a template, the less time it will take. In Johanson's case, PeopleSoft agreed to attempt three data conversions into the new human resources system. After that, Johanson's company might owe extra money.

Sometimes other costs slip in for odd rea-

sons. Scott Price, COO at Interactive Apparel, a company that offers website design and development to the apparel industry, said his company was stung by an obscure but necessary detail during its rapid implementation of SAP R/3. His company had to pay extra for forms to print customers' logos. Price found that the cost overruns that larger companies absorb during more open-ended implementations can hurt a smaller company that expects to pay only the agreed-on amount. "That's not real inexpensive," he says. "In the contract, it said that we had agreed to the basic forms. When you get down that path, sometimes you forget about some of these details."

Another regular speed bump involves integrating existing systems. There are often surprises lurking in legacy systems and processes.

KNOW THY SYSTEM

ANOTHER REGULAR SPEED BUMP INVOLVES integrating existing systems. There are often surprises lurking in legacy systems and processes. McCullough says his team had to rethink its process for offering gift certificates. The team had assumed the previous system was handling the process efficiently. "We thought we understood how that worked in Pandesic, but when we really got down to it, we found it wasn't like we thought," he says. "It caught us by surprise. We had to rethink how to do it in SAP."

Generally speaking, surprises aren't good. They're even more shocking for a company trying to contain costs and schedules. Just as in setting up a contract, planning is paramount. Replacing systems that automate the way a company does business is rarely easy, but it can be more complicated for a company trying to move from simple tools to sophisticated ERP applications. Often, that move is accompanied by growth that sparks the need for an upgrade. A smaller company that begins an implementation without



Scott Price, COO of Interactive Apparel, was stung by unexpected but necessary additional costs.

PHOTO BY RICK TAYLOR

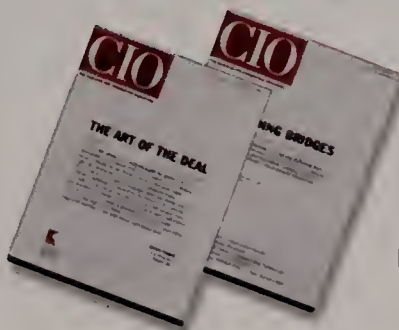
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sophisticated systems or processes needs to ensure the selected package works for a company of its size. Price says his company worked with SAP to create a demonstration of the new system. Using that demo, he pinpointed a process change requiring some software customization, but it saved Price from having to rectify the problem after the system was up and running.

REMEMBER THE POWER OF PEOPLE TECHNOLOGY GETS A LOT OF ATTENTION during a fast-track implementation, but it ends up being only as effective as the willingness of the people who use it to do their jobs. Ultimately, employees, IT staff and even customers will determine a project's success. The time to start communicating is as soon as the project begins. Managing its scope is often a hidden difficulty. On one hand, some employees will be reluctant to use a new system and will have trouble thinking outside the constraints under which they already work. On the other hand, some employees might expect too much from new technology. Those expectations might lead to requests to add more functionality—which can ultimately defeat the purpose of installing a plain vanilla, template-based, fixed-price or fixed-time package. Fast-track ERP packages offer full functionality, but additional features cost money, and determining how much is necessary is one of the most important steps in planning an implementation.

"Since our team was made up primarily of HR functional people, as they saw the

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product, the whistles and bells and lights just went off," Johanson says. "The hardest part is keeping a lid on and reminding all of the people involved that vanilla is good. I felt one of my challenges was to quickly understand what the HR capability was

and then demonstrate it."

Setting expectations can also mean calming fears. CyberCash's Joseph says one of her team's challenges was to convince employees of their new system's flexibility. "People get wrapped around the axle thinking, 'Once I do this, it's going to be this way forever,'" she says, "but we make changes every day."

With any change comes the need for training, another tricky aspect of rapid ERP implementations (see the ERP research cen-

organized five in-person sessions held on Friday afternoons. "We were able to put together pretty quickly some handouts that showed them what [they] needed to do," he says. "It took a little bit more personal attention than just sitting in front of your computer screen trying to learn it."

Done right, rapid ERP implementations can be successful. At Interactive Apparel, Price's team implemented SAP's financial, sales and distribution, materials management and warehouse manage-

ERP MOVES INTO THE FAST LANE

By 1999, ERP had developed a reputation as technology that blew through budgets and calendars. Large corporations cut ERP spending in 1999—in part because they wanted to prepare for Y2K and in part because many were either in the midst of or finished with ERP implementations. So ERP vendors cooked up rapid-implementation schemes for the loosely defined midmarket. SAP defines midmarket as companies with \$200 million or less in annual revenue, while PeopleSoft sets the figure at \$500 million.

SAP introduced Accelerated SAP in 1998. PeopleSoft jumped on the bandwagon last year with a package build around its new, Web-based PeopleSoft 8 system. Oracle has its FastForward program. Their forays into the midmarket have worked so far. ERP business picked up in 2000, thanks in part to purchases from smaller companies. SAP, for example, experienced 100 percent growth in its midmarket business practice in 2000, according to company sources. In fact, the whole ERP market is back on the upswing, analysts say. That's good news for companies large and small that were sweating out the fate of their investments in ERP a couple of years ago.

—L. Pender

ter on CIO.com). With all the effort involved in making ERP work quickly, training can slip through the cracks. NetRail's Schmidt says his company got training all wrong when it first started to teach employees their new system.

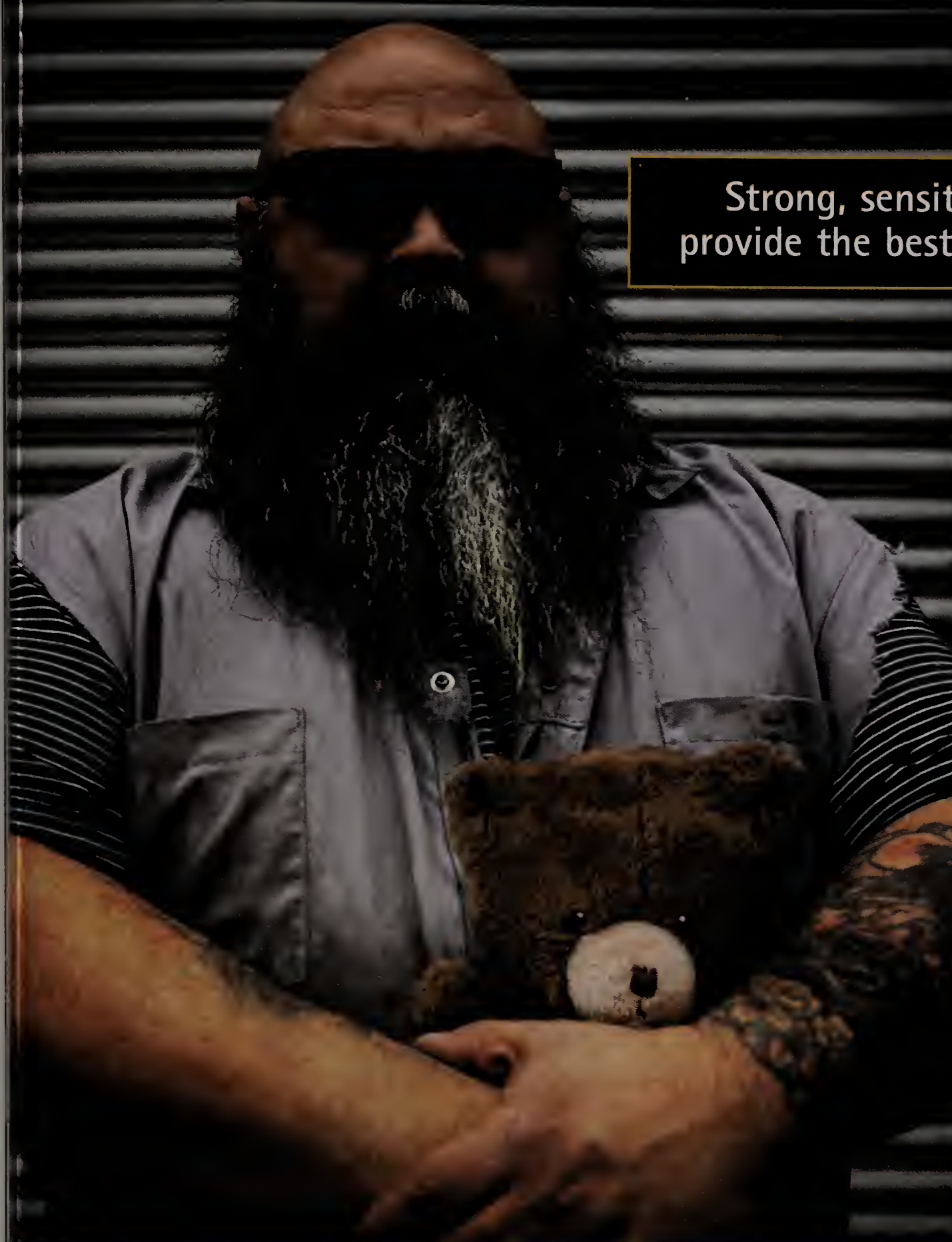
"We were originally planning to do computer-based training with our users," he says. "It was about midway into the implementation—all of a sudden one day [two consultants from SAP partner Plaut Sigma] came into my office, closed the door and said, 'We need to talk.' They said, 'Rick, they're really not getting it as rapidly as we need them to.'"

So Schmidt changed his plans. NetRail scrapped computer-based training and

ment applications in nine weeks for less than \$150,000. NetRail completed its implementation in nine weeks for less than \$200,000. McCullough has no more worries about whether his company's website will be able to handle its transaction volume.

Fast-track ERP isn't as easy as its name may suggest, but when managed well it can revolutionize a business. "It has improved efficiencies throughout the business," McCullough says. "We had a little bit of jousting back and forth, but we got through it." **CIO**

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Rodney Struhs landed more interviews after shaving years from his résumé.



of Age Discrimination

Whether it's illegal, unethical or simply bad business, too many IT veterans are getting left behind in a labor market that needs all the talent it can get

BY SARAH D. SCALET

DOES THE I.T. WORLD DISCRIMINATE AGAINST OLDER WORKERS?

RODNEY STRUHS THINKS SO. Although he is almost two decades away from qualifying for full Social Security retirement benefits, he thinks his age has kept him from finding full-time work for more than a year since his Y2K gig ended. In his first six months of job hunting, Struhs, 47, received only one or two calls, despite listing nearly two decades of experience as a project manager. Then he made some changes to his résumé, opting to include only 10 years of experience. "As soon as I shaved off 10 years, I got seven or eight

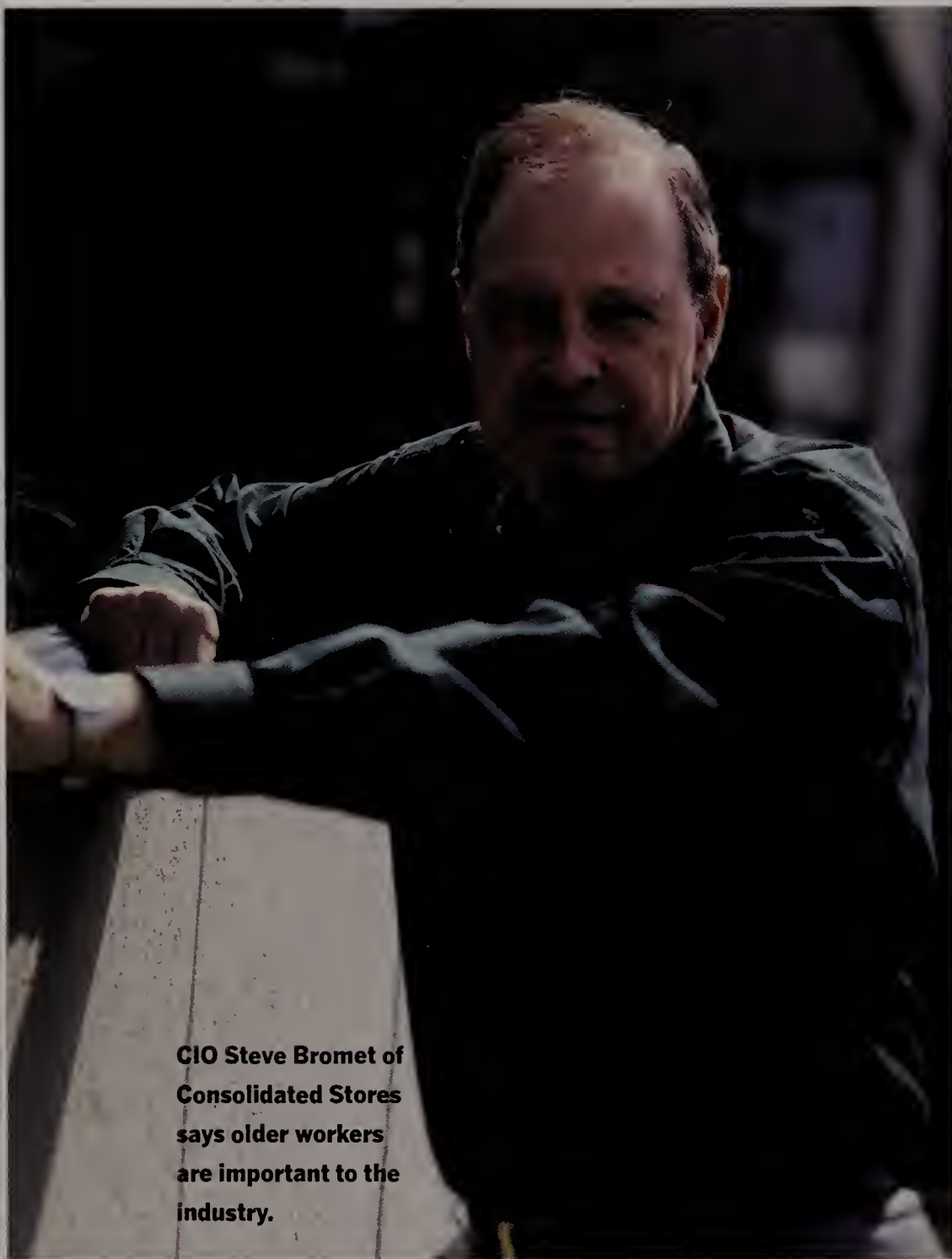
calls in the first week," he says. But the job hunt didn't end. "The interview is pretty much done as soon as they see how old you are. They'll come out with a great big smile, and as soon as they see you the smile disappears," says Struhs, who was willing to relocate from Salt Lake City. "The guys over 50 tell me it gets worse."

Countless IT veterans have written to CIO with tales similar to that of Struhs's. One article on CIO.com brought out an army of them: Within days of being asked "Do CIOs Discriminate Against Older Workers?" about 200 readers had posted answers; a majority of them gave a resounding yes.

Reader ROI

- ▶ Find out why IT has a bad reputation for how it treats its veterans
- ▶ Read about policies and practices that will prevent age discrimination in your organization
- ▶ Learn how to create a work environment that gets the most from older workers

PHOTOS BY STEVE CRAFT



CIO Steve Bromet of Consolidated Stores says older workers are important to the industry.

The IT industry has long been fighting such accusations in the court of public opinion. The stories make gripping headlines. Everyone worries about getting old, and everyone has read about Web divisions domineered by nose-ringed newbie programmers. Skills-hungry IT departments retort that with hundreds of thousands of IT jobs unfilled, no sane businessperson would discriminate; they fall back on legal ambiguities, blame the high-tech sector or dotcoms for the problem, and say to workers like Struhs, "Send me your résumé!" But it's naive to simply assume that age discrimination only happens elsewhere, and it's bad business if any workers—especially those with years of experience—are getting left behind. CIOs need to take active steps to eliminate age discrimination and prevent the damage it can cause.

A Bad Reputation

THE I.T. INDUSTRY can't cover its lack of gray hairs. According to the most recent numbers available from the Information Technology Association of America (ITAA), a trade organization in Arlington, Va., workers age 55 and older make up only 6.8 percent of the IT workforce, compared to 11.7 percent of the workforce overall. Given the explosion of technology jobs in the past 20 years, some discrepancy is understandable, but the report also indicated that professionals may be leaving the field. Twenty years after graduation, only 19 percent of computer science graduates still work in IT. The question is, Are they choosing to leave—or are they forced out because of stereotypes and assumptions? (These people cost too much. These people don't fit into corporate culture. They're hard to manage. They lack energy. They don't want to learn new skills; they can't learn new skills.)

The Rules

A 1967 FEDERAL LAW protects job applicants and employees age 40 and older against age discrimination. The Age Discrimination in Employment Act (ADEA) states that employers with 20 or more employees may not discriminate in hiring, firing, compensation, benefits, terms or conditions because of age. They also may not indicate age preferences in job ads or retaliate against individuals for complaining about age discrimination.

Here are some scenarios prohibited by the ADEA:

- The interviewer looks at a candidate's background and says, "I'm sure that you won't be interested in this position with your experience—it's an entry-level job."
- The hiring manager questions a candidate about her plans

for retirement, emphasizing that the company wants to maximize its investment in training.

- An employer starts to bring in younger employees to take over certain aspects of older employees' jobs, assuming without justification that the older employees will retire in the near future.
- An executive who inherited an older secretary from a predecessor complains that she is "too set in her ways." The executive resorts to harassment, such as giving her burdensome work, until the secretary's job is so unbearable that she quits.

ADAPTED FROM AGE DISCRIMINATION ON THE JOB PUBLISHED BY AARP © 2001 BY AARP. REPRINTED BY PERMISSION



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Back when articles with headlines like "Too Old to Write Code?" came out, Congress requested a study that onlookers hoped would answer that question once and for all. But in late 2000, when the Washington, D.C.-based National Research Council's report was released, its conclusion about the older IT workforce centered on the word *inconclusive*. The report confirmed that the IT workforce is younger than other industry employees with comparable education. More ambiguously, IT workers age 40 and older are more likely to lose their jobs than younger ones but equally likely to find new jobs in a similar length of time—although they tend to take pay cuts. The report, calling for more research, didn't answer the bigger question of why those differences exist. "It may be the result of illegal age discrimination," says study director and senior scientist Herbert Lin. "It may also be the result of employers' actions that are perfectly legal that nevertheless create the perception of discrimination."

That distinction agitates the agitators, like Norman Matloff, a University of California at Davis computer science professor who has become the most vocal advocate for IT's elders. Matloff calls the report a whitewash that wrongly focused on the narrow definition of illegal ageism.

In some states, to prove age discrimination, lawyers must show that a company intended to discriminate, explains Tom Osborne, a staff attorney for the Washington, D.C.-based AARP Foundation Litigation, the legal branch of the AARP. In other kinds of discrimination cases, lawyers need only prove

that a company did something that resulted in discrimination, intentional or not. In other words, if a company cuts costs by firing its highest-paid programmers, and if those workers happen to be over age 40, the company has not necessarily broken the law.

That doesn't mean the company made the best decision, and we're not just talking about karma. CIOs need to ask themselves tough ethical questions about how they value experience versus the latest skills or the lowest salary. Besides, no company wants the bad press of a lawsuit, or the chance of losing it. Jurors—themselves aging with every moment spent on jury duty—tend to be sympathetic to these plaintiffs. Pittsburgh attorney John Stember recalls one recent case where merely the threat of a lawsuit was enough to convince a utility company not to fire a midlevel IT employee in his 50s.

Different but Equal?

TALKING ABOUT AGE in the workplace is like asking a CIO how much money she makes. Even after one 57-year-old programmer raved about the extremities of birth dates at his company, his CIO refused to comment. Many executives are understandably reluctant to have their names tied to the debate and insist that if discrimination is happening, it's happening elsewhere. "I've always felt that in this career field, there is no discrimination," says Steve Bromet, CIO of Consolidated Stores in Columbus, Ohio, where the 100-person IT staff consists of students to sixty-somethings. "Older folks like me have an important role to play."

When age-related issues arise, finger-pointing ensues—at recruiters, human resources departments, managers or even executives. Attorneys say it's crucial that the CIO set a good example. "I suppose you could put out memos saying, 'Don't do this,' but I don't know that it does a lot of good," AARP's Osborne says. "It has to come from the top down. If they say one thing but there's a wink there and a nod here, the lower parts of the company are going to pick up on that. But if they see that there's a consistent policy to hire the best that they can get, I think that's what will happen."

The problem with all this is that even CIOs who rave about their older workers make such clear age-based distinctions that one can't help but remember the old quip about stereotypes existing because they're true. CIOs such as 42-year-old Steve Morin

Ways to Avoid Age Discrimination

- Recognize that people are living and working longer. Social Security is phasing the retirement age up to 67 and no longer penalizes beneficiaries for income.
- Keep in mind that a candidate who has only five years left until retirement may still stay around longer than the average new hire.
- Don't make assumptions about a candidate's salary requirements.
- When evaluating job candidates and employees, use structured methods that will help avoid unwitting discrimination.
- Put older and younger workers together on teams so that they can learn from each other.
- Provide training, and show that you value skill development by including it in evaluations.
- Be sure that everyone who speaks with a candidate knows age discrimination laws. They apply to everyone and not just those who make final decisions.
- Set a good example, and make it clear to your staff, human resources department and recruiters that you don't want to discriminate.

—S.D. Scalet



CONNECT

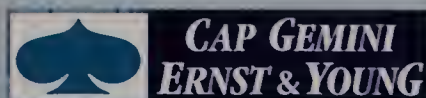
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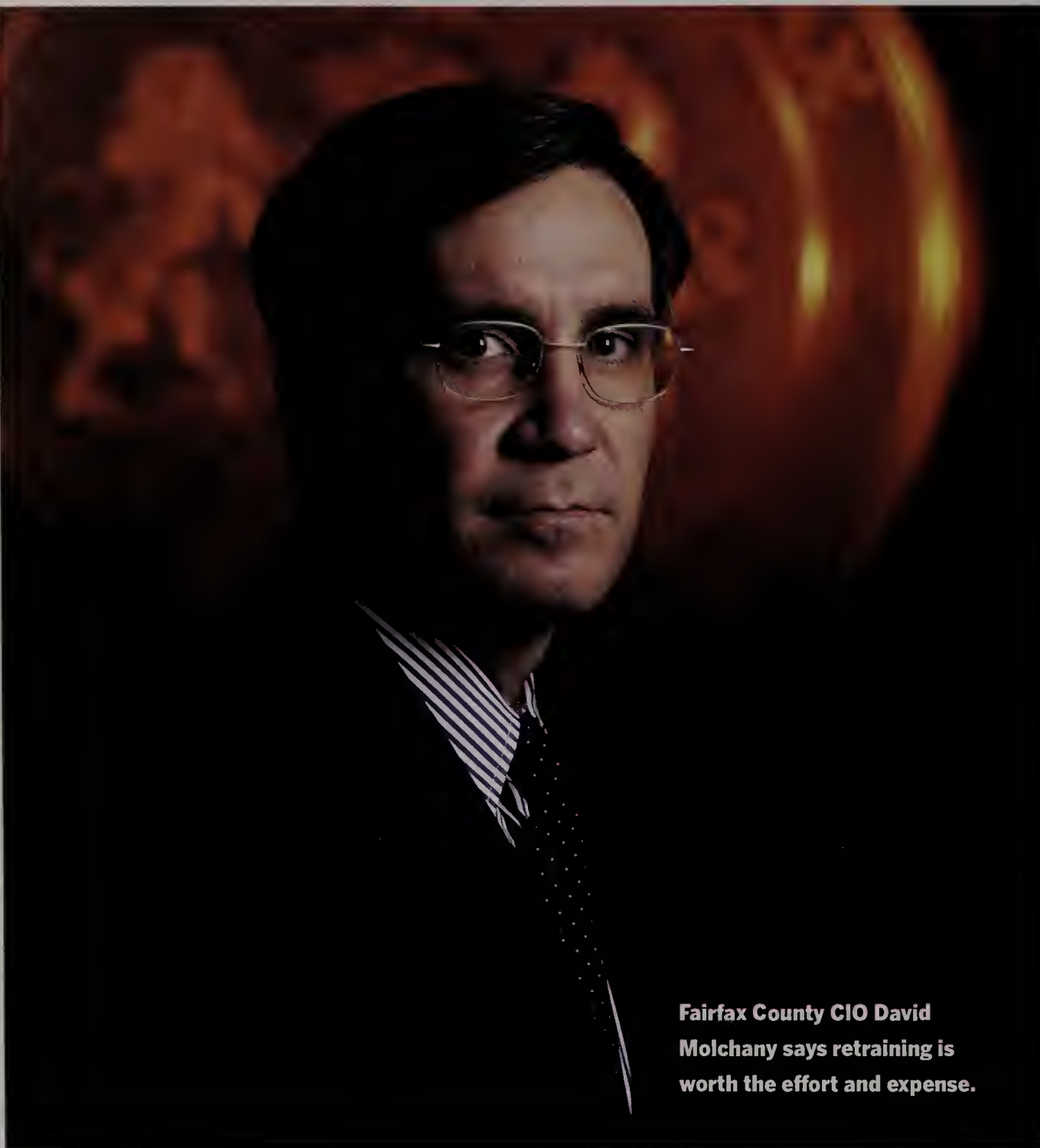


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Fairfax County CIO David Molchany says retraining is worth the effort and expense.

at TAC Worldwide Companies, a Boston-area staffing services provider, refer to their “younger workers with hot skills” and “older workers with old skills but a heck of a lot of experience and wisdom.”

There’s a fine line between making unfair assumptions and making the best use of skills that workers tend to have, but

Equality Advocates

I.T. WORKERS who think they’ve been subject to age discrimination can learn about their rights by contacting the U.S. Equal Employment Opportunity Commission (800 669-4000, www.eeoc.gov/qs-employees.html) or AARP (202 434-2060, www.aarp.org/foundation).

Morin and others bridge it by putting together teams of, er, differently abled workers. Steven Steinbrecher, the fiftysomething CIO of the county of Contra Costa outside San Francisco, asks project managers to team (older) workers who excel in back-end legacy skills with (younger) ones who excel in newer, front-end tools such as Internet and ERP extraction. The results can be frustrating, but Steinbrecher thinks the knowledge team members gain from one another is worth it.

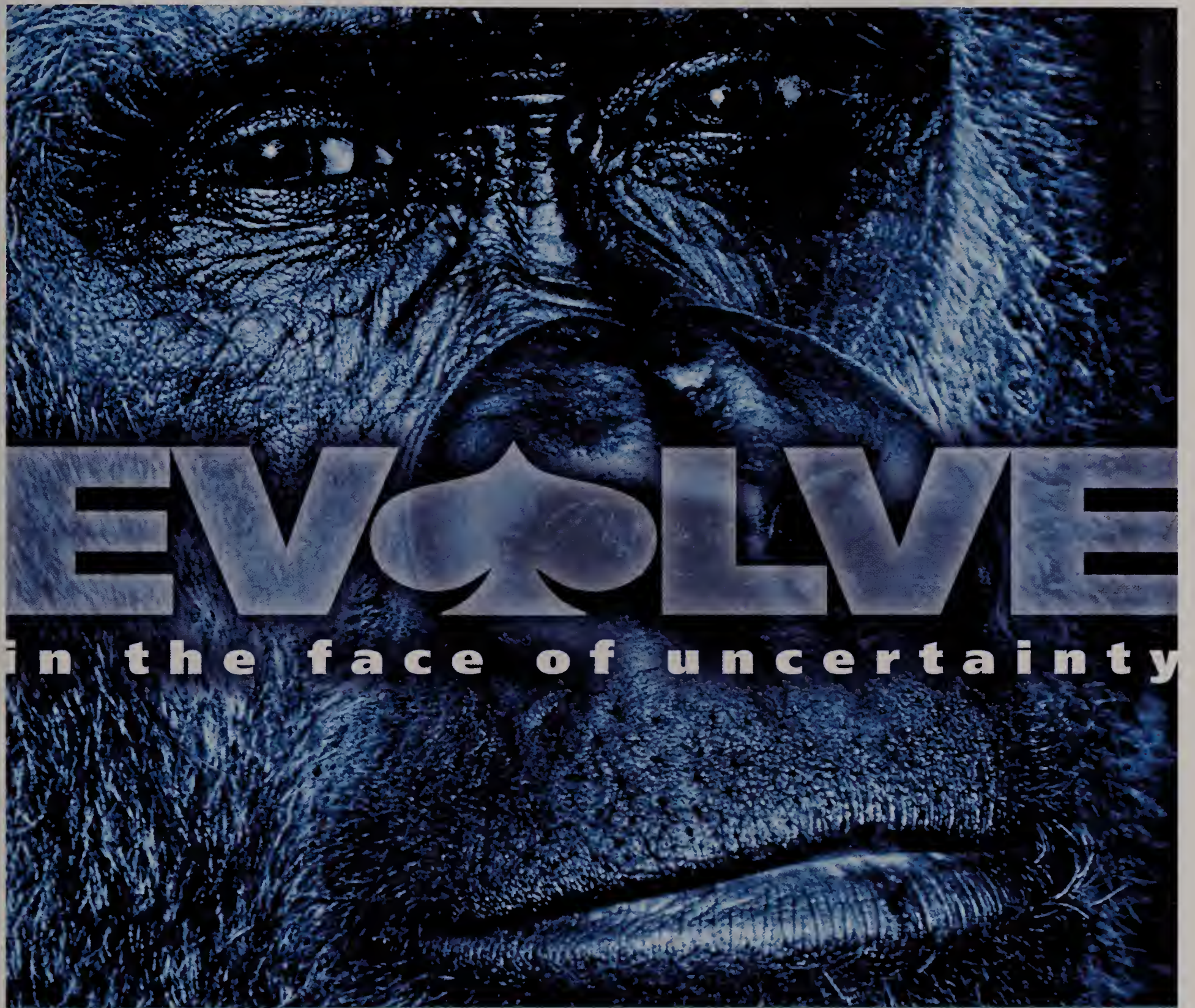
But business experience comes with a price. “A lot of companies decide that one way to cut costs is to take somebody who’s making \$80,000 a year, kick them out the door and bring in somebody making \$40,000 a year,” says H. Michael Boyd, program manager of human resources strategies research at IDC (a sister company of CIO’s publisher, CXO Media). The money they save, though, is irrelevant if a project fails—as he believes many do—because of a lack of experience.

Train to Retain

BUSINESS EXPERIENCE may come naturally with time, but the newest technical skills don’t. Even advocates for seniors—as they lament H1-B visas to bring in talent from overseas—admit that some older workers simply have outdated skills. “When skills are current, all ages are equal,” says William Payson, president and CEO of

Campbell, Calif.-based Senior Staff Job Information Exchange, which has a database of 20,000 IT workers over age 35 who are looking for work (www.seniortechs.com). Unfortunately, making a business case for training or retraining can be difficult because no one agrees who should take responsibility, who should be trained and what the most effective methods are. Tom Wilson, manager of training services for the IT consultancy CTG, headquartered in Buffalo, N.Y., says training is seen as a “necessary evil”; businesses know they have to invest in it but wish they didn’t. Some executives say they can’t afford to retrain; others say they can’t afford not to.

David Molchany, the CIO of Fairfax County in Virginia, is one of the latter. “If we find someone who’s a good fit but who we have to train to learn a complementary technology to their own skill set, then we will do that,” he says. At Contra Costa County, Steinbrecher has moved star legacy performers



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Staffing

to "the other side of the fence." And at Fingerhut Co., a direct marketing and online retailer based in the Minneapolis area, CIO Gary Bledsoe has had success putting Cobol and C programmers through a six-month transition into object-oriented development.

IDC's Boyd notes that "it's always, always less expensive to educate somebody than to try to hire somebody" and that employees just out of school tend to need more managerial hand-holding. Many CIOs consider training an effective recruiting and retention tool; in a survey on

cio.com

Staffing crisis? Skills crisis? Or no crisis at all? Different experts offer different takes on the difficult issues surrounding IT staffing today—so we got them together to duke it out. To read the discussion, "**SURVEYING THE STAFFING CRISIS**," go to www.cio.com/printlinks.

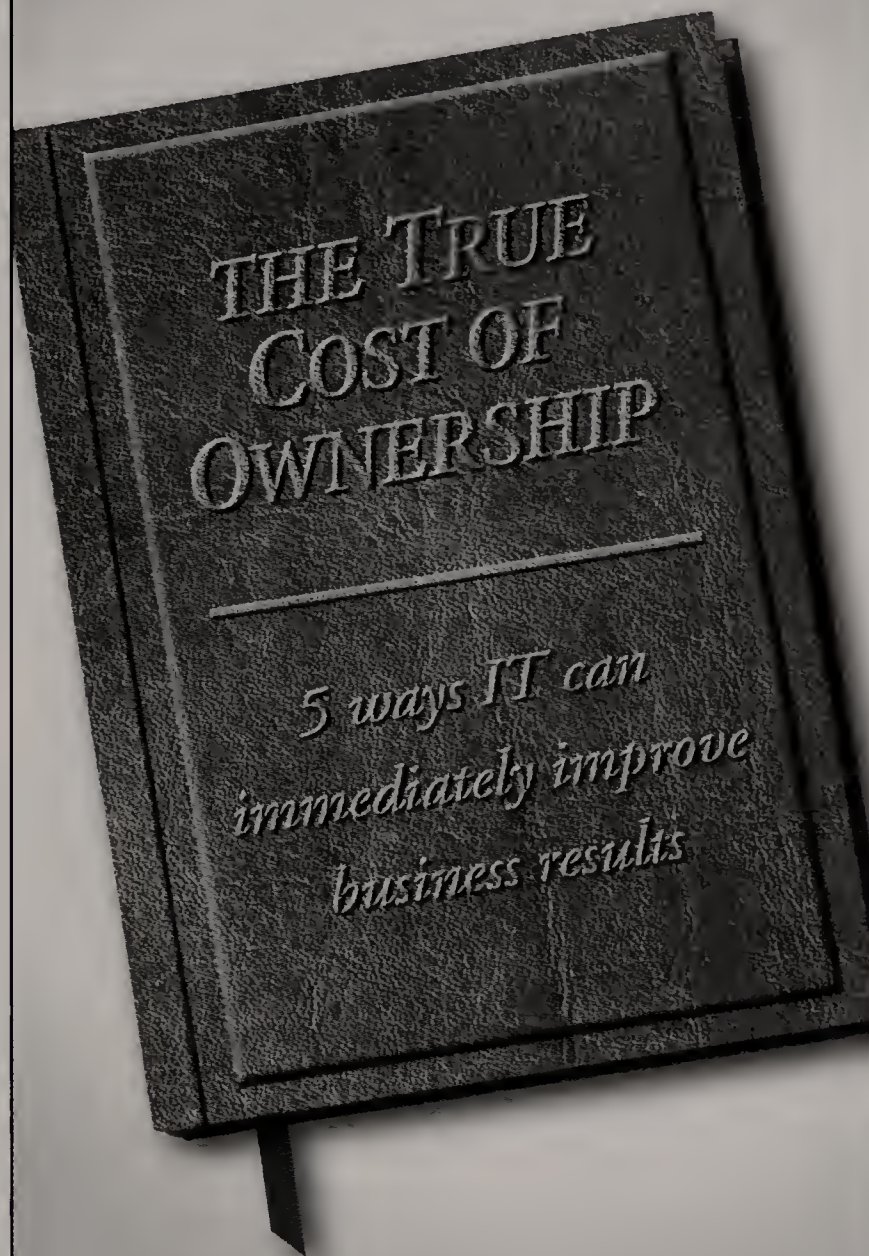
CIO.com, 48 percent of IT professionals said their companies had increased training budgets for exactly those reasons. Bledsoe notes, deliberately, that his workers are "as loyal as they get."

The mobility Bledsoe alludes to helps older workers, points out Rich Brennen, managing director of the Chicago-based executive recruiter Spencer Stuart, and not just because they're perceived as more stable. "Years ago, clients looked at employees in terms of 10-, 15- or 20-year career paths, and today that is certainly no longer true," says Brennen. "Clients tend to look at workers from a standpoint of, Can I get five years out of that person? From that perspective, it no longer matters whether they're 25 or 65."

Nevertheless, a loosening of the staffing market—in April the ITAA cut its estimates on the staffing shortage from 850,000 open IT positions to 425,000—only spells more trouble ahead for applicants and employees closer to 65. As a general rule, discrimination occurs less in tight job markets. "The dust hasn't settled on this," says Pittsburgh attorney Stember. As America's population ages and the need for business-savvy IT workers continues, CIOs can't sit back and assume that a memo to the HR department will ensure that age discrimination isn't happening. They need to take a hands-on approach to make sure that their company isn't the one in the embarrassing anecdotes. Someday, their own jobs may depend on it. **CIO**

How are you making use of IT veterans? Tell Senior Writer Sarah D. Scalet by e-mailing her at sscalet@cio.com.

The CIO sensed that PC downtime was costly.



But he never thought it would cost him his job.

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What a

**BC Gas Senior VP Patrick
Lloyd: "Customer-care
people make most of the
application decisions now."**

Before deregulation, utilities didn't have to worry about customer service. Now they do. But buying CRM software won't do the trick.

BY HEATHER HARRELD

SWITCH!

Nobody at Lakehead Pipe Line Partners knew it, but a motor at one of its sites was about to go on the fritz. If the malfunction could be caught in time, if the motor could be fixed before it needed to be replaced, it would save Lakehead, a Duluth, Minn.-based pumping company, a lot of time, money and grief. But how could Lakehead know—how could anyone know—that a motor was about to malfunction?

Enter Nordic Electric.

Reviewing Lakehead's bills, Nordic, a 5-year-old Ann Arbor, Mich.-based independent power supplier, noticed that one of Lakehead's plants was consuming more energy than usual. Putting two and two together, Nordic called Lakehead and informed it that there was a problem at that specific plant—most likely a motor about to fail.

Reader ROI

- ▶ Learn how customer focus means more than CRM
- ▶ Understand how to reorganize your business to become customer-centric
- ▶ Discover new ways to use customer information

"They were surprised that we were able to diagnose stuff like that," says Richard Polich, vice president of operations and regulatory affairs at Nordic. "At first they wanted to know why we were even calling them."

In another case, Nordic's system noticed that Martin Marietta Materials, a Raleigh, N.C.-based chemical and construction material supplier, had a power spike every morning when employees switched on all the equipment at the same time. Nordic suggested that by staggering the times for turning on the machines, Martin Marietta Materials could save 20 percent on its electric bill.

"This is a partnership," Polich says. "Our desire is not to have a customer for just one year."

Nordic, which uses a CRM system from Alpharetta, Ga.-based Peace Software to cull its customers' bills in order to provide these types of services, is symbolic of a new world order: power suppliers emerging in deregulated markets to challenge the traditional gas and electric monopolies. Armed with the latest technologies and offering advanced Web-based applications, they are cropping up in most metropolitan markets. But whereas utilities in England, Canada and Australia are old hands at using IT to compete in deregulated markets, many U.S. utilities are still wrapped in stifling monopolistic shrouds (see "Let There Be Competition," Page 149). They're wrestling with new supply-and-demand paradigms that have pushed companies like Pacific Gas & Electric in Rosemead, Calif., into bankruptcy. They're reluctant to make investments in CRM technology even as a new breed of providers begins picking off their most lucrative customers.

As the old monopolies are beginning to discover, competing in this new deregulated, customer-centric world is not just a matter of acquiring and implementing new technology; it demands dramatic and profound philosophical shifts.

The old industry joke that describes customers as "meters at the end of the bill" doesn't cut it anymore.

The old **INDUSTRY** joke that describes customers as "**METERS** at the **END OF THE BILL**" doesn't cut it anymore.



**Nordic VP of Operations
Richard Polich sees his
customers as partners.**

Putting a Face on the Meter

"Every day our customer wakes up is a day that he can choose to stay with us...or choose to leave," says Rick Larson, director of sales and customer service for Enmax, a Calgary, Canada-based electric utility and until three years ago a monopoly owned by the city.

As of Jan. 1, 2001, Enmax will be competing in a market open to all newcomers. As a result, it has taken an aggressive approach to customer service.

As part of the company's new strategy, it has changed some key employee performance metrics. For example, Enmax marketing employees are measured not just on customer brand awareness but on how customers feel about the brand, as measured by focus groups. In addition, finance and accounting employees will be measured on overall customer satisfaction. Again, this will be measured through focus groups and by calls made by a third party to customers who have reached the call center. The sales team will be measured by more traditional metrics, such as the revenue generation, but they will also be measured on customer satisfaction.

In addition to tying customer-care metrics to employee performance measures, Enmax is moving to link all its

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“Every day our **CUSTOMER** wakes up is a day that he can **CHOOSE** to **STAY** with us, or choose to **LEAVE.**”

—Rick Larson, director of sales, Enmax

processes together through a CRM system from Bellevue, Wash.-based Onyx Software in an effort to add value to all its interactions with customers.

“You can never anticipate where and how a customer will enter an organization,” Larson says. “We want to be ready so when that customer decides to interact with us, we fully leverage that.”

For example, in case a customer walks through the front door with questions, even Enmax receptionists will have full access to account information. If an executive comes to the office for a meeting, the receptionist will have an accessible bio of the executive. The receptionist could ask the executive how she likes Enmax and capture her responses. “A casual comment is now captured as a usable piece of information about that customer,” says Larson.

With the CRM system, Enmax salespeople will know before calling a customer if he had asked about a bill the day before and whether his issues had been satisfactorily resolved. In addition, customer service can query customers about how they found the company and then feed that information to marketing and product development departments.

The company also plans to use a portal to give employees access to internal systems. They can customize it to add weather data or news, but the customer data will always be in full view. “It’s our employees’ interface into our company,” Larson says. “They’ll be viewing customer data to get to our company, which brings the customer right to their desktop every day.”

While Enmax is leveraging a portal to provide employees with a constant reminder of customer service, BC Gas—which provides energy and utility services in Western Canada and the U.S. Pacific Northwest—is preparing for deregulation in November 2002 by replacing its 20-year-old Unisys-based customer information system with CRM software from Peace. With the new system, more than 250,000 utility customers in British Columbia’s interior are able to view billing and consumption information, request interactive customer service, and retrieve other information about their accounts over the Internet. In addition, customers will be able to enter their own meter-reading data via the Web. And BC Gas is in the process of converting its remaining 500,000 customers in the Vancouver and coastal area to the same Peace system. BC Gas has already linked the CRM system with its interactive voice response (IVR) system and provided computer-telephony integration features designed to streamline customer service. For example, when BC Gas customers enter their account number and PIN in the IVR system, their account information is automatically retrieved from the database and displayed on the customer service representative’s workstation.

As it hones its service focus, BC Gas has started to think of customers as “people not premises,” says Patrick Lloyd, senior vice president of business technologies and support. Until a few years ago, he says, the company’s databases were premise-centric—

tracking the gas usage of a specific house. Now, the databases are customer-centric—focusing on people even as they move from home to home.

Competition Down Under

While a handful of states in the United States have begun in recent years to open their electric utilities market to competition, deregulation has been a driving force in Australia since 1996. While most states have tailored their deregulation plans so that customers will automatically remain with their monopoly supplier unless they choose another, in Australia all customers must choose a provider; the entire country is in effect one big market. This creates a competitive field for a company like Advanced Energy, a former monopoly that is based in rural New South Wales but counts large customers from various areas in the country—such as the Sydney Opera House—among its customers.

Competition from utility startups have kept Advanced committed to continually refreshing its CRM solution, which it first launched in 1993, says Ken Stonestreet, general manager of information services at Advanced.

Advanced was one of the first utilities in Australia to begin offering its customers Internet access to account information, and last December the utility began to offer electronic billing and online payment options. Commercial and industrial customers can download electricity consumption information at half-hour intervals.

“This is particularly relevant to consumers who may be interested in pursuing ways to modify their usage patterns to take advantage of tariff or rate structures,” Stonestreet says. “In addition to being able to download the data, customers can view their consumption patterns in 3-D graphical format online to help them easily visualize overall patterns and detect any anomalies.”

In addition, Advanced has used its CRM system from Peace to tie its customer service systems to its back-end databases to initiate automatic processes. For example, a customer can request a final meter read and disconnection via the website. That request is sent directly to the company’s main system to be scheduled without an intermediary keying in that information.

This tight integration has helped the company differentiate itself from some competitors, which might offer a “flashy front-end” website offering online access to tailored customer data without having back-office integration in place to provide detailed account information, Stonestreet says. He credits CRM with enabling Advanced to retain 93 percent

of its contestable customers since the 1996 deregulation date.

Wait and Drift

While some utilities like Nordic have taken a proactive stance toward customer attraction and retention, only one-third of U.S. utilities offer online access to account information, and most of those do not offer advanced applications such as online bill payment, says Bill Brownell, former vice president and director with the Boston Consulting Group, which has worked extensively with utilities facing deregulation. The remaining two-thirds of utilities in the United States have taken what Brownell calls a “wait and drift” attitude.

“They’re not as far along as they should be,” says Brownell.

Let There Be COMPETITION

How the rules changed for the utility industry

THE ROOTS OF ENERGY and gas deregulation can be traced back to the Ronald Reagan-era trend in the early 1980s when several industries, including the savings and loan and airlines, were opened for competition.

The competitive landscape of the U.S. electric utility market, where \$300 billion per year of retail electricity is consumed each year, is governed by the individual states. Competition is the result of the 1992 federal Energy Policy Act. That law required all utilities to share their transmission lines. Now a utility in a high-rate state can buy much cheaper electricity from a state with lower rates.

That, at least, was the theory in 1997 when California became the first state to open its entire retail market for competition.

In practice, Pacific Gas & Electric in California was driven into bankruptcy last month when out-of-state providers raised those fees through the roof at the same

time that PG & E was prevented from passing the increased cost on to customers.

In 1998, Pennsylvania became the second state to open its market. New York, New Jersey, Maryland and Illinois have all opened their retail electric utilities for competition, and other states may soon follow suit.

While the United States is slowly seeing its states open their utility markets, the model they are following is much different than the way England and Australia chose to go. There, a whole country is one big market, and each customer must choose a provider from among all the retailers. In the United States, the existing provider is left as the default service provider if the user chooses not to choose.

Federal control over the natural gas market ended in 1978, and the first residential natural gas choice programs were launched in 1997 and have since spread nationwide.

—H. Harreld

"They are fairly risk averse with respect to investing in technology and behavior and cultural changes."

While most former monopolies are making an effort to deliver customer service, the frame of reference they use is not broad enough to be successful, argues Paul Grey, CTO of Peace. For example, utilities frequently cite call-handling statistics as evidence of improving customer service but, says Grey, they often do not know whom they have been servicing.

"Is the call center actually delivering quality customer service to the best, most profitable customers?" Grey asks rhetorically.

Most utilities, he suggests, cannot answer that question because monopolies could assume that their customers were not going anywhere and therefore did not bother distinguishing between them.

For many energy consumers, their main interaction with the utility comes with the monthly bill. So service for those customers could be equated with the quality of the billing and payment process. Yet

utility bills are famously confusing. And to date, e-billing, which could offer great advantages in terms of convenience when making payments, often replicates the bad, old utility bill electronically.

Utilities that opt to take a less aggressive stance on customer service need only look to England, where approximately half of all utilities have disappeared since deregulation began there in the mid-1990s.

"Companies that didn't do [customer service] well are out of the retail business," Brownell says. "They ended up essentially being pushed out of the retail market or ended up being acquired."

Those utilities that remain are heavily investing in CRM-style technology, says Barry Moxley, partner at Newburn Consulting, a Swindon, England-based IT consulting group. One English utility, United Utilities, has even identified CRM and customer service as an opportunity for providing billing and customer service outsourcing to other companies, Moxley says. Centrica, the retail spinoff from British Gas, was worth 27 percent of British Gas when it was spun

off in 1997. Today it is worth \$13 billion, almost as much as British Gas. Centrica's CEO Roy Gardner says his top priority is customer service. The company manages customer data centrally, which it culls in order to cross-sell other services.

However, the cultural shift required for monopolies to get their competitive juices flowing has taken several years and is still evolving, Moxley says. "I recently shocked a customer by saying, 'You actually don't have a relationship with the majority of your customers. The only person they see is the meter reader. All you're doing is sending them a bill. What sort of relationship is that?'"

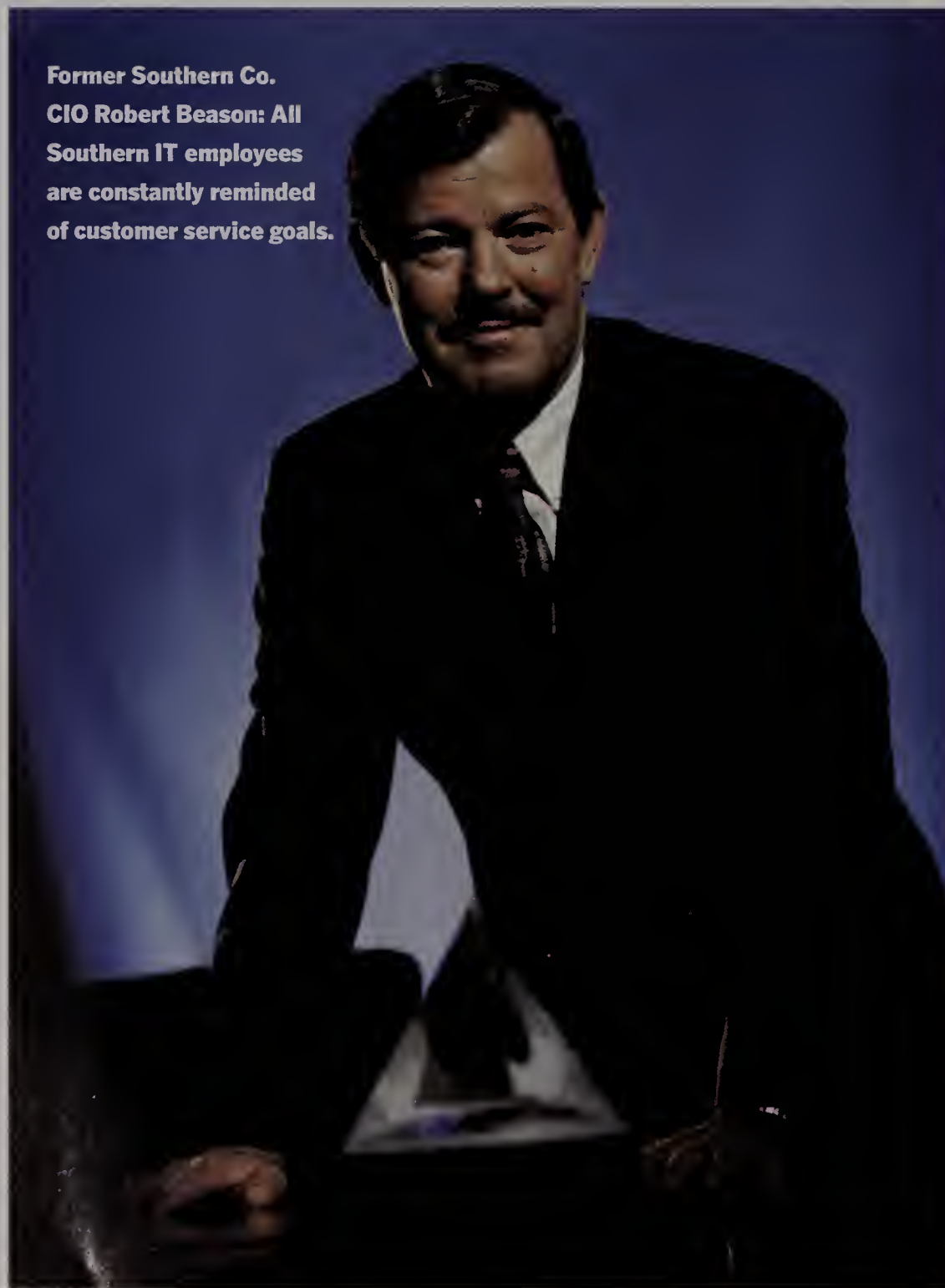
So how can utilities used to one way of doing business learn to change their tune?

Learning to Change

Brownell says one of the first steps successful utilities in deregulated markets take is to separate the retail arm of the utility from the traditional "pipes and wires" function so that employees of each division feel that they are working for a separate business. In addition, the skill base of employees has to be changed, either by bringing in new people from competitive industries or by improving the customer service skills of existing workers.

BC Gas had to close 23 of its small, remote payment and service centers, consolidating their function into one center in order to isolate 100 employees from other company operations and hone their focus on customer service. Only a handful of employees were willing to move to the new office, and the company replaced those who would not move with new ones who had call-center experience.

**Former Southern Co.
CIO Robert Beason: All
Southern IT employees
are constantly reminded
of customer service goals.**



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During the past three years the utility's management has turned over 75 percent, including the CEO, senior vice presidents and vice presidents, with their replacements coming from more service-oriented industries like telecommunications, consulting and marketing.

Honing the focus on customer service has also meant that BC Gas has decentralized its IT application development operations, says Lloyd. "The customer-care people make most of the application deci-

"Our IT FOLKS are working on Web-based CUSTOMER-CARE systems—they're PART of the customer-care TEAM."

—Robert Beason, former CIO, Southern Co.

sions now," he says. "They're closer to the customers; they have a better understanding of what they need. Our field service people now have their own business systems application group. They are very picky and choose their particular business systems and are actually responsible for installing them because they've got to respond to a changing customer environment fast."

Southern Co. in Atlanta has also concentrated on moving its 1,000 IT employees closer to its customers to ensure that their applications are focused on service, says former CIO Robert Beason, who recently retired. Southern Co. is the largest producer of electricity in the United States and the parent company of Alabama Power, Georgia Power, Gulf Power, Mississippi Power and Savannah Electric.

"We [IT people] have a tendency to be people who are in the basement," Beason says. "I've often heard people say, 'You never want to get them out and interfacing with the customer.' That's changing. Our folks are working on Web-based customer-care systems—they're part of the customer-care team. They're a part of that business unit."

The company is rolling out several systems targeted toward different customer segments. For its large industrial customers, Southern Co. offers real-time pricing information via the Internet. Commercial customers can look at usage patterns online to compare consumption at various company locations. For the residential customer, the company was planning to roll out an electronic bill presentment and payment system. That system will be integrated with an outage messaging system and the voice system at the call center. When customers call during an outage, the system will detect their location and tell the caller how long the outage may last based on current restoration work.

As for the electronic bill presentment and

payment system, company officials hope they can knock 20 percent off their total costs for printing and postage for the 4 million bills the company mails out each month, for a whopping savings of \$13 million annually.

To instill a focus on customer service in the company culture, all Southern Co. employees go through a training program that spans eight weeks, and employees are continually reminded of customer service goals. Every newsletter has columns written by executive leaders on the importance of customer service. The company also provides IT service level agreements to all of its business units to foster the feeling that service to all of its customers is vital, even internal ones.

In addition, the IT staff constantly benchmarks its 15 products, including voice systems, mainframe systems, IP data networks and energy management systems to others offered in the market.

"You look at what you do and see what the market will do it for," Beason says. "You create a culture that says, 'We're going to continuously look at our products and services from a market perspective.' We show that information to our employee base in IT. We've got 10 or 12 of our products that we believe are undermarket. We've got three or four that might be overmarket."

The Utility Challenge

The utility industry is unique and so are the challenges confronting it.

"If I'm Amazon.com and I know you read a book by this author, I can go back and sell you another book from that author," says Bill Swanton, vice president of the utilities practice at AMR Research. "But once you buy your electricity, there's not much more I can sell you. People are going to make money by preventing churning, by keeping the customer. The issue [for utilities] is customer retention."

In addition, in many states, state law prevents retail energy providers from mining customer databases maintained by their parent company—often the former monopoly incumbent—in order that they not have an unfair advantage over new players. Many incumbents are only allowed to share this information with retail providers.

As a result, the pressure to compete effectively by revamping deep-seated cultural attitudes often means utilities must take drastic measures to mold themselves into retail players.

"In any of these unregulated opportunities for the energy service providers, they're just bringing in fresh people," Swanton says. "They're grabbing a bunch of telecommunications and consumer products people. The culture of the [utilities] bureaucracy is so deep and so long that it makes the cultural problems faced by getting a sales force to use CRM pale in comparison." **CIO**

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Have thoughts on how IT can transform the utility industry? Send them to letters@cio.com. Contributing Writer Heather Harreld frequently reports on IT issues.

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- Sales Conversion Rates: 5%
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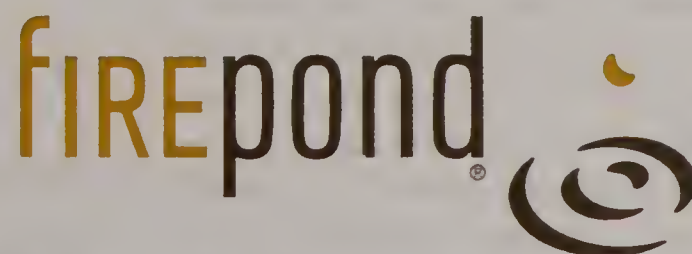
COMPANY B.

- Sales cycle: 10 days
- Proposal time: 3 hours
- Order Accuracy: 99%
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- Email response time: 2 hours
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THE PRODUCTIVITY MIRACLE

Just look at the jump in income over the past five years for evidence of information technology's positive effect on productivity

BY EDWARD YARDENI

I sympathize with Maximus. The great and victorious Roman general, played by Russell Crowe in *Gladiator*, is tired of fighting and longs to return to the peace of his farm and family. Instead, the fictitious farmer soldier is wrongly accused of crimes against the state and enslaved as a gladiator who must fight to the death to right the wrong.

As one of the first proponents and a long-time defender of the view that IT has brought us enormous productivity gains in recent years, I feel like Maximus: I can no longer sit back and let the latest round of naysayers go unchallenged.

PRO These barbarians at the gate seek to prove that the new economy is a house of cards, not a solid fortress. It collapsed along with the Nasdaq, they say. The productivity gains from technology have been overrated, they argue, and in any case, are over. Our collective crime was irrational speculation and overinvestment. The punishment is a prolonged period of economic stagnation.

Allow me to differ. A decade ago, I predicted that competitive forces unleashed by the end of the Cold War would mean that the pricing environment would get tougher for companies. To boost profits, they would have to cut costs and boost productivity. At the time, the idea that there could be a rebound in produc-

Continued on left column Page 156



Edward Yardeni,
chief investment strategist at
Deutsche Banc Alex.Brown

THE GREAT DEBATE:

On Monday morning, you've got to face the CFO and defend your budget. It would sure help if you could argue that past IT expenditures have increased the productivity of your company before you explain why your budget should go up this year. ■ Well-prepared is well-armed, so here *CIO* presents two sides of the heated productivity debate. You can quote

PHOTO BY EVAN KAFKA



Robert Gordon,
social sciences professor at
Northwestern University

IT & PRODUCTIVITY

Edward Yardeni, chief investment strategist at Deutsche Banc Alex.Brown, to prove that investing in IT does enhance the productivity of your workers and will continue to do so. And you'll be prepared for those pesty counterarguments by reading the perspective of Robert J. Gordon, the Stanley G. Harris professor in social sciences at Northwestern University in Evanston, Ill.

PHOTO BY JEFF SCIORTINO

WHAT PRODUCTIVITY MIRACLE?

Don't fall for the hype.

The recent "economic miracle" was transitory and based on unsustainable results.

BY ROBERT GORDON

The new economy has been compared in importance with the discovery of electricity and the invention of the internal combustion engine, and journalists frequently describe it as a new industrial revolution. The hype includes claims that the new economy is responsible for sustained productivity growth and that its very existence has eliminated the normal ups and downs of business cycles.

Before we dispute such claims, let's define *new economy*. It would be much too broad to describe it as everything the electronic computer has ever achieved. Decades ago, mainframe computers eliminated clerical drudgery, but somehow that did not budge the stagnant growth rate of the U.S. economy's productivity; it remained a mere 1.4 percent per year from 1973 to 1995. This mismatch between IT investment and stagnant productivity growth evoked Nobel Prize-winner Robert M. Solow's famous 1987 Productivity Paradox: "We can see the computer age everywhere but in the productivity statistics."

Because the computer began business operations in 1951 and the economic miracle dates only from 1995, a more focused definition of *new economy* would be "the *acceleration* of the rate of technical change in the computer indus-

Continued on right column Page 156

CON

IT Value

Continued from Page 154

tivity was widely viewed as far-fetched. After all, the nonfarm productivity of American workers rose a meager 1.4 percent per year on average from 1973 to 1995. Technology wasn't helping to improve the situation, or so the argument went. Economists were baffled by this lackluster productivity performance and called it the Productivity Paradox.

The Miracle Begins

But in 1996, the Productivity Paradox became the Productivity Miracle as the rise in output per hour in the nonfarm business sector of the economy jumped to 2.9 percent per year on average, and it stayed at 2.9 percent through 2000.



PRO While 2.9 percent may look like a small number, it converts into big numbers across time. If productivity grows at an annual rate of 2.9 percent, living standards double in 24 years. But, at a productivity increase of 1.4 percent, it takes almost 50 years for living standards to double.

Here's how many economists explain this jump. While companies have been investing in computers and software for decades, it took a while for them to figure out how to use these tools not just as a convenience, but to change the nature of people's jobs. At first, their effect was too negligible to show up in productivity statistics. But by the second half of the 1990s, as each innovation built on the one before,

Continued from Page 155

try after 1995." The price of computer power (a megabyte of memory or a gigabyte of hard drive capacity) declined more than 30 percent a year from 1995 to 1998, double the 10 percent to 15 percent decline in price before 1995. Combined with this technological acceleration was the invention of Web browsers and widespread access to the Internet.

Taken together, the invention of the Web and the rapid decline in computer prices spurred a massive wave of investment in computers, peripherals and software. An important fact to remember is that economywide investment in computers grew at

CON



20 percent before 1995 and at 40 percent after 1995. As we shall see, the fate of the U.S. economy in 2001 and the years beyond depends on whether computer investment continues to grow at 40 percent a year or slows again to the pre-1995 rate of 20 percent or even lower.

Whatever happens from here, there is no question that the U.S. economic miracle of 1995 to 2000 occurred and created enormous benefits for everyone—not just stockholders but also consumers and employees. Between 1995 and 2000, output per hour in the business sector of the economy rose at an annual rate of 2.9 percent, double the pre-1995 rate. This productivity revival became a source of pride at home in the United States and of envy abroad, and it made the 1995 to

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the aggregate effect of IT on productivity became pronounced enough to register in national statistics, hence the 2.9 percent jump in output per hour.

Given such evidence, I thought my days of feeling like Maximus would surely be over. After all, the correlation between technological innovation and productivity gains has been trumpeted by no less an authority on the economy than Federal Reserve Chairman Alan Greenspan and embraced by the Congressional Budget Office (CBO). On more than one occasion, Greenspan has declared that American workers are much more productive than they used to be, and the reason is the proliferation of information technology. And he firmly believes that this productivity will only increase. In his congressional testimony on Jan. 25, 2001, the fed chairman endorsed the CBO's projections that the federal budget would reach \$6 trillion in surpluses during the next 10 years, assuming that productivity will continue to grow at a 2.5 percent pace. He added, "As I have argued for some time, there is a distinct possibility that much of the development and diffusion of new technologies in the current wave of innovation still lie ahead, and we cannot rule out productivity growth rates greater than [those] assumed in the official budget projections."

Federal Approval

The folks at the Commerce Department would agree. In a

2000 U.S. economic miracle possible. The productivity acceleration held down inflation and directly boosted GDP growth far above rates that were thought possible before 1995, thus allowing Alan Greenspan's Federal Reserve Board to resist more than minor increases in interest rates. Soaring profits and an unheard-of surge in stock market valuations created trillions of dollars in wealth from this revival in productivity growth.

A Miracle that Can't Hold

But there are reasons to doubt that the foundation of the Productivity Miracle can remain intact through the next five years. As a historical fact, productivity growth always contains a temporary component when the economywide output of American workers grows faster than its sustainable rate. This seems to have occurred when real GDP grew by 6.1 percent between mid-1999 and mid-2000. Even the most optimistic estimates of America's sustained growth potential are 4 percent or somewhat lower. If output growth were to slow, productivity growth would also surely slow.

CON

And this is what happened. As real GDP growth fell from 5.6 percent in the second quarter of 2000 to 1.1 percent in that year's fourth quarter, productivity growth fell from 6.3 percent to 2.2 percent. As



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recent report, they argue that the official data may still *understate* the effect of high-tech innovations on economic growth. And they propose a different method of valuing the output of the computer industry: adjusting the raw dollar figure of computer sales, because computers are constantly improving in power and quality. In 1999, for instance, final sales of computers were \$92.5 billion. By taking into account the enhanced value of each new computer, the

PRO

“At the end of the day, what matters is how much money we bring home. And the fact is that real wages and salaries rose during the mid-'90s to a record high.”

—EDWARD YARDENI

Commerce Department came up with the figure of \$245.9 billion, which is what it uses in reporting the contribution computers have made to the GDP. Using this measure, industries that are heavy users of the new information technologies, such as education and certain financial services, have generated significant productivity growth.

The skeptics, of course, see it differently. They see a Productivity Mirage. Indeed, this is the title of an article by the always thoughtful John Cassidy, a reporter who frequently writes about economics. In the Nov. 27, 2000, issue of *The New Yorker*, Cassidy observes that virtually the entire productivity miracle has been concentrated in the technology sector. In other words, computers have created productivity gains for the computer industry but have no significant influence elsewhere.

Robert Gordon, a professor of social sciences at Northwestern University, makes a similar argument in these very pages. Even within the high-tech sector, he argues, permanent productivity growth will turn out to be illusory.

Such arguments are sensible and espoused by very civil counterrevolutionaries. We all agree that productivity is hard to define and harder to measure. No wonder, therefore, that reasonable men and women can look at the same phenomenon and see it differently—as a paradox, a miracle or a myth.

What's in Your Paycheck?

At the end of the day, however, what matters is how much

CON

the economy slowed, productivity growth slowed with it.

There are several reasons the U.S. economy cannot grow as fast in the next few years as it did during the five-year boom between 1995 and 2000:

- An unsustainable decline in the unemployment rate.
- An unsustainable increase in our international trade deficit.
- An unsustainable increase in stock market prices that in turn fueled unsustainable growth in personal consumption spending.

But that's only the beginning of the story. The nation's greatest experts on the effects of computer investment, Stephen Oliner and Daniel Sichel at the Federal Reserve Board, have estimated that a full two-thirds of the 1.4 percent productivity growth revival was due to the post-1995 growth of computer investment. Part of this acceleration reflected faster growth in production of computer speed and memory per hour of work by employees making the computers, and the rest reflected the benefits enjoyed by the entire economy in having so many more computers around to make each hour of work more productive.

Too Tied to the Computer

That's all well and good, but Oliner and Sichel's research raises a scary prospect for the next few years. Because they attribute so much of the productivity revival to an acceleration in computer investment, their work implies that most of the productivity revival will disappear if the growth of computer investment dips below 40 percent to, say, the 20 percent growth rate that was typical before 1995. Yet even 20 percent seems optimistic for the next year or two. The growth rate of computer investment was down to 5 percent in the last quarter of 2000 and it looks likely to turn negative in 2001, just as it did back in 1990 to 1991.

In short, some of the productivity revival was inherently transitory while much of it relied on a 40 percent growth rate of computer investment that could not be and has not been sustained. Think of all the reasons investment in IT hardware is slowing down.

1. The monumental effort to build websites is largely complete, and it requires less hardware and software investment to simply maintain those sites after they are built.

2. The timing associated with the year 2000 issue compressed the normal computer replacement cycle into a

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IT Value

money we bring home. That is the reason productivity is so important. It is *the source* of our standard of living. Productivity determines our purchasing power and our real incomes—which, in turn, determine how much we can buy. This concept was first most simply and clearly explained by Adam Smith in *The Wealth of Nations* (1776). According to Smith, prosperity is based on the division of labor, or “outsourcing” as we say today. Thanks to the butcher, the baker and the candlestick maker, the rest of us can do what we do best, thus maximizing our productivity and our pay.

The fact is that real wages and salaries per worker rose during the 1990s to a record high—the fastest pace since the 1960s—after stagnating along with productivity from the mid-1970s through the mid-1990s. This is proof positive that there really has been a rebound in productivity and that it has been more widespread than the doubters claim. The prosperity of the previous decade was not limited to a few high-tech nerds with stock options while the rest of us flipped hamburgers. On the contrary, more than half of the 24 million jobs created since 1987 were for professional and management positions, where pay is relatively high.

No one disputes the fact that there has been productivity growth within the IT sector itself. Consider, for instance, that between 1995 and 1997, workers at computer manufacturers such as Dell and Compaq raised their productivity at an annual rate of 41.3 percent. There is persuasive anecdotal evidence that IT has also boosted productivity in other industries and will continue to do so. Federal Express, Wal-Mart and

PRO Citigroup could not even exist today without the information technologies that empower their managements to run such huge global organizations so successfully.

British Telecom claims that procuring goods and services online will reduce the average cost of processing a transaction by 90 percent and reduce the direct costs of goods and services it purchases by 11 percent. International Paper Co. and Motorola plan to put microchips in cardboard boxes, a big step toward eliminating bar codes and ultimately bringing the entire manufacturing supply chain online.

I agree with Greenspan: The best may be yet to come. In his January testimony, he observed, “Economists have long noted that the diffusion of technology starts slowly, accelerates and then slows with maturity.” The extraordinary plunge in the cost of computing and telecommunicating suggests that information technology will proliferate at a faster pace in the years ahead. As technology becomes cheaper it can be used by more of us to increase our productivity and our prosperity. **CIO**

Edward Yardeni is chief investment strategist at Deutsche Banc Alex.Brown. He can be reached at yardeni@yardeni.com.

shorter than normal period during 1999 and 2000.

3. The usual race to replace hardware to use evermore complex software seems to have petered out. Computer journalists tell their users not to upgrade beyond Windows 98 unless they are heavy users of complex games or heavy down-

“The days of double-digit growth rates in profits and stock margin returns are over, and growth in both real GDP and productivity will slow significantly.”

—ROBERT GORDON

loaders of music and DVDs, yet these types of computer leisure activities do not generate productivity gains for business companies.

4. Most analysts agree that there has been a massive amount of overinvestment in fiber-optic telecom capacity.

5. Many doubt that the benefits of the Web can be squeezed onto the tiny screens of next-generation mobile phones, thus raising doubts about the financial sustainability of much of the worldwide telecom industry that has created so many resources and taken on such debt in the hope that the Web-enabled mobile phone is the wave of the future.

Coming off a high is equally difficult for an economy as for an addict. The adjustment in 2001 to 2002 will be painful. I don’t expect a depression, and we may even escape an officially defined recession. But the days of double-digit growth rates in profits and stock market returns are over, growth in both real GDP and productivity will slow significantly from the past five years, and the adjustments that everyone from Wall Street to Sand Hill Road require have only just begun. **CIO**

Robert J. Gordon is the Stanley G. Harris professor in social sciences at Northwestern University in Evanston, Ill. You can read more about his economic arguments at www.northwestern.edu/economics/gordon. Which side of this debate do you favor? Let us know at letters@cio.com.

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Presentation: Awards ceremony takes place January 29, 2002, at the CIO Enterprise Value Retreat. Winners will be profiled in the February 1, 2002 issue of *CIO Magazine*.

ENTRY GUIDELINES

- ▶ The system must have been operational prior to July 1, 1999 (yes, we really mean '99!).
- ▶ Entrants must agree to be featured, along with their systems and organizations, in a *CIO* article.
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- ▶ Only one entry per company will be considered.
- ▶ Entries must be made jointly by the CIO/IS executive sponsor AND by the business sponsor for whom the system delivers value.
- ▶ IT vendors, public relations and advertising companies, consultants and other third parties may NOT apply on behalf of another company. They are encouraged to forward this application to the "owner" of the system or to contact *CIO Magazine* to recommend that an application form be sent to the client.

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For more information, visit our website at www.cio.com/eva or contact Cristina Sousa at 508 935-4630 or via e-mail at csousa@cio.com.

CIO Enterprise Value Awards

T I M E L I N E

Applications Due:

June 15, 2001

Winners Notified:

October 2001

Awards Ceremony:

January 29, 2002

at the CIO Enterprise Value
Retreat, Loews Ventana
Canyon Resort, Tucson, Ariz.

1 COMPANY/BUSINESS UNIT

Name of parent company

City, State where headquarters are located

Publicly or privately held?

Annual revenues

Industry

Name of business unit or organization

City, State where located

Number of employees at business unit

URL

2 ENTRANTS

A. Name of entering IS executive/system sponsor

Title

Name of division, department or unit

Address

City

State Zip

() ()

Telephone Fax

E-mail

B. Name of entering business-unit executive/sponsor

Title

Name of division, department or unit

Address

City

State Zip

() ()

Telephone Fax

E-mail

3 SUPPORTERS

Please list four people (other than the entrants) who are willing to be interviewed with regard to the system, its development, its use and the value returned. At least one should be a member of the technology team that developed the system and should have played a significant role. At least one should be a primary user from the sponsoring business unit. The other two may be from either organization or may represent suppliers, customers or others intimately familiar with the system.

A. Name

Title

() ()

Telephone Fax

E-mail

Reason for inclusion

B. Name

Title

() ()

Telephone Fax

E-mail

Reason for inclusion

C. Name

Title

() ()

Telephone Fax

E-mail

Reason for inclusion

D. Name

Title

() ()

Telephone Fax

E-mail

Reason for inclusion

DEADLINE: JUNE 15, 2001

Mail to: CIO Enterprise Value Awards • c/o Cristina Sousa • CIO Magazine
492 Old Connecticut Path • P.O. Box 9208 • Framingham, MA 01701-9208
or e-mail to csousa@cio.com
Visit our website at www.cio.com/eva

For more detailed information on the type of data the judges would like to see, including a model application, please visit our website at www.cio.com/eva.

4 THE NOMINATED ORGANIZATION

In one paragraph, describe your organization and what it does. Please include your most recent annual report or 10k; a corporate brochure; and any other relevant material that will help describe your company and its standing within its industry.

5 THE NOMINATED SYSTEM

Tell us about the nominated system and demonstrate its importance to the organization by completing the following sections. Please limit your material to one or two pages.

System Description: In one sentence or less, describe the system or IT initiative you are nominating (e.g., order fulfillment or sales-automation system; global intranet).

Cost of Investment: Include all up-front development costs and annual maintenance charges.

Date Deployed: Please indicate when the system was fully in production. If all users were not online by **July 1, 1999**, please detail what went live when.

Technical Profile: Briefly describe the technology of the nominated system, including its architecture; hardware, software and development tools used; and networking/communications hardware, software and services. Please include the names of all major vendors and products.

Technical Excellence: Describe the degree of overall technical innovation of the solution (does it employ cutting-edge technology?).

Industry Standing: Describe the system's uniqueness within your industry (is this an industry first or second, or is this a common solution?). Please be as specific as possible and include supporting data.

This is the most important part of the application!

6 BUSINESS VALUE

Describe the primary objectives of and value derived from the IT investment. (See "Defining Value" on Page 1.)

List and prioritize the three most important contributions the system has made to the organization, its industry or the overall community it serves. Make sure to describe what the value is, how it was achieved and how it relates to the mission of the organization. Include details and supporting data (e.g., detailed ROI for financial value, proof of increased market share, proof of customer loyalty) whenever possible. Please limit this section to a maximum of three pages.

7 TRUTH OF INFORMATION RELEASE

The following release must be signed by both nominating executives if the application is to be considered. Unsigned releases will invalidate the entry.

I hereby state that the information provided is true and complete to the best of my knowledge and belief.

I authorize the release and use of, in connection with the CIO Magazine Enterprise Value Awards program, any and all materials furnished by me or others at the company contacted for this judg-

ing. I understand that information submitted on this application or subsequently gathered during the evaluation and judging process may be used in articles or any other type of publicity relating to the CIO Magazine Enterprise Value Awards program.

I also authorize the release and use of my name, my company's name and my likeness, including but not limited to any photographs and any recording of my voice or image that may be taken of me for CIO Magazine. I agree that no compensation shall be due to me or my company for such usage.

I recognize that failure to meet these conditions or to provide sufficient material that can be published can cause the application to be rejected at any point in the process at the sole discretion of CIO Magazine.

1. Signature of nominating IS executive _____ Date _____

2. Signature of nominating business executive _____ Date _____

If you are selected as an award recipient, would you be willing to participate in a small group session at the Enterprise Value Retreat or appear on stage to discuss how you accomplished your goals?

Yes ☐ No ☐

Would you be willing to participate in a CIO Magazine/Harvard Business School case study?

Yes ☐ No ☐

8 OTHER EDITORIAL OPPORTUNITIES

If you are not selected as an award recipient, are you willing to be contacted for inclusion in other articles in CIO Magazine?

Yes ☐ No ☐

How did you obtain this application form?

- ☐ Saw the ad in CIO Magazine
- ☐ Received a mailing from CIO Magazine
- ☐ Came across it on the CIO.com website
- ☐ Heard about it at last year's Enterprise Value Retreat
- ☐ A consultant or vendor recommended we apply
- ☐ Heard about this award program from an IT colleague
- ☐ Other (please identify) _____

CHECKLIST

- Have you filled out...?
- ☐ Company/Business Unit, Entrants and Supporters Information
- Have you included...?
- ☐ Brief description of your organization
 - ☐ Annual report or 10k and corporate brochure
- Have you included on separate pages...?
- ☐ Nominated System
 - ☐ Business Value
- Have both entrants signed and dated...?
- ☐ Truth of Information/Release
- Have you checked off...?
- ☐ Other Editorial Opportunities
 - ☐ How you learned about the CIO Enterprise Value Awards program

PREVIOUS WINNERS

APCOA Inc. 1995	New York City Department of Finance 1998
AT&T Universal Card Services Corp. 1994	New York City Transit Authority 1993
Bell Atlantic Corp. 1997	Office Depot Inc. 2001
Black & Veatch 1998	PCs Compleat Inc. 1995
Brigham & Women's Hospital 1996	The Perrier Group of America Inc. 1993
Capital One Financial Corp. 1999	Pfizer Inc. 2000
Caterpillar Inc. 1995	PPG Industries Inc. 1999
Charles Schwab & Co. 2000	Procter & Gamble 1998
The Chase Manhattan Corp. 1997	Rockwell Space Systems Division (SSD) 1996
Chicago Bureau of Parking 1994	The SABRE Group 1999
Commonwealth of Massachusetts 1995	SBC Communications Inc. 1999
Complete Health Services Inc. 1994	Schlumberger Ltd. 1997
Dell Computer Corp. 2000	South Florida Water Management District 1994
Fidelity Investments 1997	State Street Global Advisors 1998
Gensym Corp. 1996	SynOptics Communications Inc. (now Bay Networks Inc.) 1994
Harrah's Entertainment Inc. 2001	Tech Data Corp. 1998
Household Financial Corp. 2000	Telogy Inc. 1996
Hyatt Hotels & Resorts 1995	Texas Instruments 1993
Kmart Corp. 1995	Travelers Managed Care and Employee Benefits Operations 1993
Lone Star Gas Co. 1993	Tufts University 2001
Los Angeles County Department of Public Social Services 1994	United HealthCare Corp. 1996
McDonnell Douglas Helicopter Systems 1996	U.S. Army Pacific Regional Program Office 2000
MacGregor Medical Association 1997	U.S. Environmental Protection Agency 1998
Medical Center of Delaware 1993	
The MITRE Corp. 1999	

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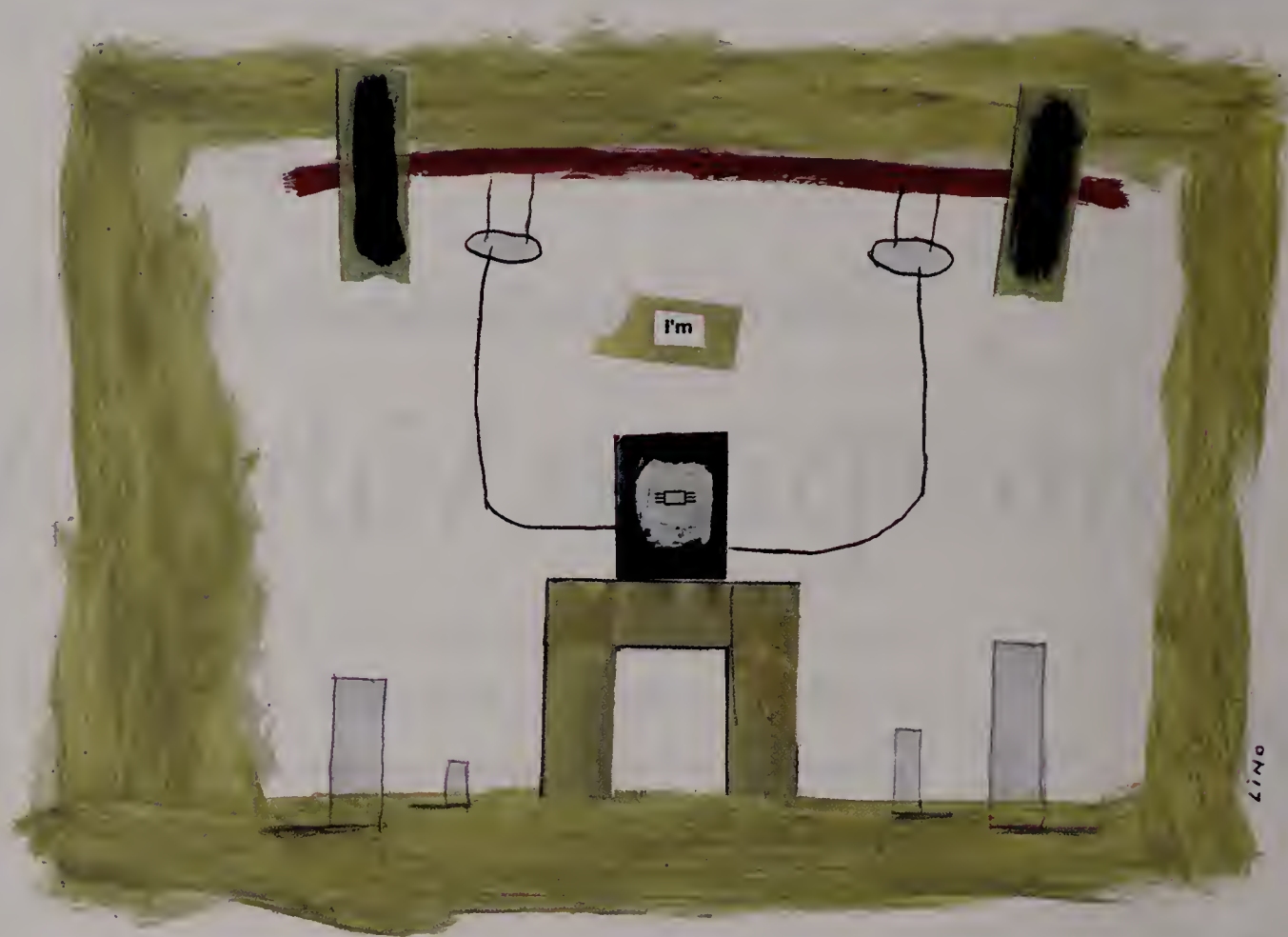
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Emerging technology

INNOVATION and PRODUCTS in the VANGUARD

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New Wave Servers

For CIOs, it may be the thin season BY MATTHEW W. BEALE

GIANTS HAVE ALWAYS seemed destined to fall. But while the demise of monolithic, general-purpose servers in enterprise computing is not yet imminent, a relatively new class of smaller server appliances has been creeping up and brandishing a slingshot.

Thin servers—a.k.a. server appliances or ultra-dense servers—won't boldly go where larger, traditional servers cannot (unless you count exceptionally small closets). They do essentially the same things as their larger brethren. But instead of trying to be all things to all users, thin servers support a

Edited by Christopher Lindquist. Send your thoughts and ideas for future columns to et@cio.com.

thin servers...good viruses?...tiny transistors...ubiquitous Internet

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single activity simply, reliably and inexpensively. According to Pushan Rinnen, an analyst with Stamford, Conn.-based research company Dataquest, these features will help the server appliance market experience 62 percent compound annual growth rate from 1999 (slightly under \$1 billion) to 2004 (more than \$10.5 billion).

Doing One Thing Well

Common server appliances provide a straightforward solution to a standard server function—printing, Web serving, e-mail, file sharing and such. They are usually bare-bones devices costing less than \$2,000 and designed to fit in single-space, rack-mounted cases the size of your aver-

And today's servers often use mobile processor technology and less expensive (nonerror correcting) RAM to reduce costs and keep power consumption low, but such components don't have long histories of reliability in the server space. Given those caveats, companies must be careful about where they incorporate the devices.

Despite the question marks, many big-name computer vendors, such as Compaq, Dell and IBM, have begun jumping into the thin server market along with small makers, the likes of Los Gatos, Calif.-based FiberCycle Networks; Rebel.com in Ottawa, Canada; and RLX Technologies in The Woodlands, Texas. The power of the lure to thin servers is evident: Compaq even filed

There are significant drawbacks to the thin server model. The devices are usually designed to do one thing and one thing only.

age pizza box. Installation generally involves plugging them in, turning them on and configuring a few settings through a simple browser-based interface. Once configured, they can be pretty much left alone to do their jobs with minimal intervention. And if one goes down, you simply pop another of the devices into its place.

Appliances also have another appeal, says Giga Information Group analyst Stacey Quandt in Santa Clara, Calif. Companies can purchase the appliances as needed, and they cost relatively little compared with most traditional servers. As a result, enterprises can realize return on investment in months rather than years.

That said, there are significant drawbacks to the thin server model. The devices are usually designed to do one thing and one thing only. If you suddenly need more firewall protection and less Web serving, you can't reconfigure your existing thin servers to perform the necessary tasks.

suit against startup RLX, alleging that the new company stole away key high-density server developers from Compaq projects.

"Everybody's chasing that appliance server model," says Mark Bayliss, president and CEO of Winchester, Va. -based Visual Link Internet, an ISP and virtual hosting service. "They've all contacted us and said they're coming out with something."

Bayliss's company chose to work with Cobalt Networks in Mountain View, Calif., a company that Quandt calls the market leader in appliances. Many other analysts and insiders agree, pointing out that Cobalt almost single-handedly created the server appliance market as we know it, carving their own niche full of stylish bright-blue boxes some four years ago. (Sun Microsystems recently acquired the company in a move intended to bring Sun a solid measure of market penetration in both the areas of high- and low-end servers.)

new products

Cost Cutter

Software maker **Kintana** has announced the availability of **Kintana Product Suite Release 3.1**. The set of software tools is intended to provide "technology chain automation," allowing IT departments to more quickly plan, build, deploy and support e-business applications. The product includes several modules, including Create (enterprise request process management), Drive (planning, tracking and execution), Deliver (deployment management), Accelerators (templates of best practices to enhance use of the other modules) and Contori (online information exchange and knowledge base). Pricing begins at \$5,000 for a power user license and \$1,250 for a standard user license. For more information, visit www.kintana.com or call 877 546-8262.

Disk Saver

Raxco Software recently released version 4.0 of its **PerfectDisk 2000** workstation and network disk defragmentation product. PerfectDisk 2000 identifies usage patterns and attempts to reorganize disks in a manner that maximizes performance. In addition, version 4.0 now lets users choose from different data organization options, allowing them to fine-tune a disk to certain applications. The software now requires only

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Applying the Appliances

Visual Link had been building its own Linux machines for dedicated Web hosting until it noticed a considerable market potential in hosting sites on appliances instead. The company soon struck up a strategic agreement with Cobalt, creating Cobalt-Racks.com, and began to almost immediately sell more than 200 servers per month (customers "buy" a Cobalt system to host their site, but Visual Link maintains the hardware at their own site). "The appliance-

Internet firewall and proxy. Linders discovered only after his search that the CEO of NetWinder and his own CEO are brothers.

While tapping into the allure of appliance simplicity and a browser-based interface, the NetWinder has an additional edge: lower power consumption—a requirement for some and a pleasant bonus for others.

In late February 2001, Rebel.com released the first server based on a Transmeta Crusoe chip, originally designed for laptops—a chip that consumes approximately

Thin servers need to expand their offerings beyond the simple chores they now perform if they intend to keep expanding their markets.

hosting market allowed the people who had the marketing skills, without the problem of having an IT department, to go directly into [the website] business," says Bayliss.

In addition, technical support costs—Visual Link's largest expense after buying bandwidth—fell by 90 percent, according to Bayliss, because the thin servers required less regular maintenance and fewer experienced administrators than the older Linux boxes.

Derek Linders, a technical specialist with Mississauga, Canada-based EDS Innovations, a consulting and solutions provider, similarly had been eyeing server appliances, but he hit a snag when he tried to develop a low-cost solution for a customer that would cover firewall protection, Internet sharing (for 50 PCs on one DSL connection) and remote access to servers for e-mail, voice mail, and server maintenance and support.

Then Linders found the box he was looking for from Rebel.com. The company manufactures the NetWinder 3100, a product that can act as a file server, virtual private network gateway, print server, Web server, e-mail server, collaboration server,

one-fourth the power of a similar Intel processor. This is a significant issue for companies running rooms filled with servers.

While not as touchy about temperature as old-world mainframes, traditional servers often still require cooling systems to deal with their heat and avert potential meltdowns. But low-power servers, such as the NetWinder, allow enterprises to safely cram more servers into a space, again helping to reduce costs. And other vendors are quickly following suit: Fiber-Cycle Networks is using Transmeta processors for its WebBunker thin server, as will RLX Technologies when its products ship later this year.

Staying Thin?

Despite their advantages, thin servers need to expand their offerings beyond the simple chores they now perform if they intend to keep expanding their markets. But that should begin to happen soon.

"We're going to see more ISVs [independent software vendors] targeting the appliance architecture, and developers looking to these applications and developing to the appliance," observes Quandt.

new products

5 percent of a disk to be free in order to perform a defragmentation. The product includes a Quick-Scan feature to quickly identify which disks need attention, a tool for recapturing disk space from Microsoft Exchange and the capability to automatically schedule networkwide system shutdowns for unattended boot-time defragmentation. The product lists for \$44 per workstation or \$219 per server. For more information, visit www.raxco.com or call 800 546-9728.

Change of Address

In a perfect world, all employees would use their work e-mail addresses for all business-related communication. In the real world, however, new employees come on board with their own e-mail addresses, and current employees often maintain more than one mail service for both business and personal correspondence. Now

Re-Route.com offers a service that sends automated change-of-address announcements, allowing customers to consolidate their e-mail usage to a single account. Re-Route servers forward any mail sent to an older address to the new address and send a change of address notification to the original sender. The service works with most ISPs, including America Online. The first month of Re-Route service is free; three additional months cost \$25. For more information, visit www.re-route.com.

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"The new Web servers are still scrambling accounts! I'm on it."

XING GAO
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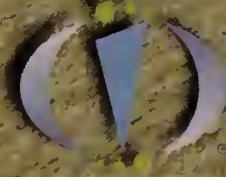
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Significant trends will open up the servers' architectures and application program interfaces, expanding options for CIOs looking into thin server technology. This could mean that IT departments will have their development teams writing software for thin servers and that software vendors, such as Microsoft and IBM, will write software for specific thin clients.

Next-generation technologies could make these servers even more appealing, according to Crawford del Prete, senior vice president for hardware research at IDC (a sister company to *CIO*'s publisher, CXO Media). Several server makers—including Intel spinoff Ziatech in San Luis Obispo, Calif., and San Jose, Calif.-based Force Computers—have already borrowed the “blade” form factor from routers (ultra-thin rack-mountable slices that contain complete systems) and can now stuff a half dozen or more processors into a space formerly taken up by two CPUs. And while today's thin servers are built with a single, immutable purpose in mind, del Prete says future versions will act as adaptive pools of computing resources, able to switch among a variety of tasks.

Such systems, however, are a few years off, however. Today, even the devices' boosters raise a note of caution. For organizations that say they want to “do database and sales” and “run a couple hundred clients on each machine,” thin servers are not only appropriate but also appealing, Bayliss says. But, “there are still jobs where thin servers will not compete,” he says. If you want to host a Yahoo or an extremely large site, this isn't the place to look, he adds.

Others concur. “I don't think any large enterprise is going to run their entire operation off a couple of appliance servers,” observes Summit Strategies analyst Harve Tannenbaum. “As a piece in the mix, however, they can be a wonderful tool.” ■

Freelance Writer Matthew W. Beale is working on several fiction projects and creating a new magazine-website that will cast a critical gaze at technology. He can be contacted at trona@mindspring.com.



PREDICTIONS

Internet

Dawn of the Information Utility

BY 2005, today's version of Internet service will be replaced with a new model, the Internet utility, according to a February Forrester Research report. But getting to this point will require work on the part of both technology providers—and the government.

The report, “The Ubiquitous Internet,” paints a picture of a future that includes on-demand, reliable and affordable service penetrating nearly every aspect of people's personal and business lives. And this new service will be treated much like we treat traditional utilities, such as water and power, today, only this utility will provide bits over a network instead of water through pipes or current through wires.

As a result, employees will use the Internet to drive their careers—and their companies. Employees may use their personal devices such as PDAs for business purposes. Salespeople will have competitive research available instantaneously, anywhere. And workers will be able to pursue “just-in-time training” from home, office or on the road.

But the vision faces hurdles—both technical and political. The report notes that technology providers must still perfect the building blocks of the Internet, making them easy, reliable and secure. Forrester also predicts several roles for the government: The increasing importance of data will necessitate increased digital diligence by federal law enforcement agencies. The federal government will also have to evaluate local legislation that may arise as smaller government bodies attempt to tax the Internet and protect citizen privacy. And, the report states, the government must promote full access to the Internet—much as it already does for power, telephone and mail—guaranteeing that lower-income households are not left behind.

—Christopher Lindquist

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Business within your reach.

REVISIT

viruses

Good Software Gone Bad

Are we ready yet for the beneficial computer virus?

BY FRED HAPGOOD

TEN YEARS AGO, computer security guru Fred Cohen made a revolutionary suggestion, one that inverted the roles of hardware and software. In traditional IS architectures, hardware persists while software is transient; the same processor executes instructions from many programs. This is why we say that software runs on hardware. Cohen suggested building an architecture around mobile programs, applications that would move around a network, recruiting and organizing hardware as needed. In this vision, the programs would endure while the hardware would come and go. In effect, the hardware would run on the software.

The primary function that Cohen saw for his mobile programs was ensuring reliable and efficient resource distribution. Most computers spend almost all their time doing nothing; Cohen's theory stated

that mobile programs could find and harvest this unused capacity. If you allowed them to copy themselves—an intrinsic part of the vision—they could distribute themselves in huge numbers throughout the whole universe of unused capacity, attacking very large problems with vast amounts of parallel processing.

Cohen, now a senior member of the technical staff at Sandia Nation Laboratories and a senior partner with Fred Cohen and Associates consultancy, also defined a set of situations—primarily where programs needed to interact with many databases—when it seemed to make sense for a program to send copies of itself to each database rather than have one master program sitting in a central location and sending requests. Cohen even wrote two Unix programs, both essentially bill-collection agents, to illustrate his con-



new products

Palm Makeover

Software maker **Aladdin Systems** has announced the release of **GoBar 2.5**, a customizable user interface for Palm OS devices. GoBar provides drag-and-drop file organization, customizable color and grayscale combinations (on Palm OS 3.5 and higher), a drag-and-drop tool for beaming data to other users, a drag-and-drop trash can, a battery charging status display, 3-D icons, an available memory display and other features. The product is compatible with PDAs running Palm OS 2.0 and higher, and it has an estimated street price of \$14.95. For more information, visit www.aladdinsys.com.

Tape Raider

Secondary storage manufacturer **MaxOptix** has announced the availability of the first in its new line of RAID tape storage solutions. **StreamIT** is designed to provide the reliability and performance necessary for serverless backup applications. The StreamIT includes a fault-tolerant chassis, a PowerStream RAID controller and Sony AIT-2 drives. It can transfer data at rates up to 130GB per hour and offers up to 400GB of storage. The StreamIT supports both RAID Level 1 (mirrored data) and RAID Level 3 (data striped across five drives). The product is available in rack-mount configurations with

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SONY

cepts. CIO thought his ideas were provocative and potentially important, and in April 1992 we ran an excerpt from one of his articles. After all, this is how the brain seems to work: Memories appear to persist even as individual neurons are born and die.

In retrospect, Cohen should have drawn on this biological connection and given his theory some name like "digital neurobiology." If he had done so, he probably would have been fighting off potential investors. He was a virus specialist, how-

Then in the late '90s a number of programs appeared that let users contribute unused computing resources to problems of public interest. The most famous is David Anderson's SETI@home, which distributed the problem of examining radio telescope data for patterns that might indicate extraterrestrial intelligence. The concept caught on quickly, and today dozens of projects in science and medicine are soliciting volunteers ("Help solve the protein folding problem!"), while a number of companies,

Nobody says *virus* when discussing grid computing, but the concept has much in common with Cohen's original idea.

ever, (he even claims to have invented computer viruses) and that is what he called his mobile programs—viruses. From his point of view, the term was technically accurate. His articles came with titles like "Harnessing the Subtle Power of Computer Viruses." (Our own excerpt was titled "The Virtuous Virus.")

At that time, unfortunately, technology culture was in no frame of mind to burden itself with complicated distinctions between good viruses and bad viruses. Today, computer viruses are a nuisance, threatening the loss of a day or two of productivity, if that. In those days, it was not clear that the threats posed by viruses could not bring down a company altogether. When Cornell graduate student Robert Morris's experiments with a virus got out of control, he was arrested, convicted, fined and booted out of college. At one point, Cohen himself briefly lost network privileges when an overzealous system administrator discovered the nature of his research. The idea of releasing viruses deliberately, for good reasons or bad, was simply beyond the pale, and Cohen's ideas sank without a trace.

including one started by Anderson himself (Austin, Texas-based United Devices), sell programs meant to carry what is now called "distributed" or "grid" computing into corporate networks and enterprise computing.

Nobody ever even breathes the term *virus* when discussing grid computing, but the concept has much in common with Cohen's idea: Programs spread out through the landscape, looking for, recognizing and recruiting unused resources.

Of course grid computing clients are not autonomous—users authorize each contribution. But a number of researchers believe that as questions get more complicated and access devices simpler, queries will naturally become self-executing and autonomous. Recently two Dartmouth researchers, David Kotz and Robert S. Gray, predicted (in a paper called "Mobile Code: The Future of the Internet") that in a few years nearly all major Internet sites will host some form of mobile agents—or as Cohen would have called them, viruses. ■

"Please open this e-mail message, it contains a good virus." Yeah right. Tell it to et@cio.com.

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Developed by Intel, the world's smallest, fastest complementary metal oxide semiconductor transistor features internal structures that are as thin as three atomic layers—about 1/100,000th the thickness

of a sheet of paper. "We looked to the biological world for our inspiration," says Gerald Marcyk, director of the components research lab in Intel's Hillsboro, Ore.-based technology and manufacturing group. "The transistor easily fits inside a string of DNA."

Intel's breakthrough comes just in time, since many scientists had been warning that Moore's Law (the principle that says

the maximum number of transistors on a chip will double every 18 to 24 months) was about to come to an abrupt halt. Electronic circuits can only get so tiny before they start overheating and behaving erratically, and many scientists believed that the practical limit to semiconductor miniaturization was in sight. But by using a group of undisclosed new materials, Intel was able to lower to a minimum the debilitating voltage leakage that normally occurs in increasingly miniscule circuits. To reduce the friction that generates heat in tiny circuits, Intel researchers dropped the transistor's voltage down to .85 volts (Intel's Pentium 4 runs at 1.7 volts).

The transistor represents a two-generation leap ahead of today's available technology, says Marcyk. In about five years, the company plans to cram 400 million of the transistors onto a chip that will run at 10GHz. Since Intel's current top-of-the-line Pentium 4 processor has 42 million transistors and runs at 1.5GHz, it would appear that Moore's Law is more than safe for the foreseeable future.

Still, for all of its promise, Intel's transistor marks only a temporary reprieve. It's widely believed in scientific circles that circuits will get so small in about 10 years that designers won't have enough atoms available to separate components. Beyond that point, a new technology will have to take over, perhaps photonic circuits or something not yet discovered. "We'll need to assess our options at that time," says Marcyk. "But for now we've bought ourselves some very valuable breathing room."

—John Edwards

Intel's breakthrough comes just in time, since many scientists had been warning that Moore's Law was about to come to an abrupt halt.

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Opinion

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Difference Engine

The Social Impact of Technology

The Parent Trap

Using technology to snoop on your teenager creates more problems than it solves. An honest relationship would be far more fruitful.

BY WILLIAM S. POLLACK

RICK'S MOTHER WAS shocked to discover that the electronic "footprints" on her family's Internet browser revealed numerous pornographic websites, which, she recalls, "turned my stomach when I tracked them down." Just the other day her usually reasonable and mild-mannered 14-year-old son had been apprehended by the police while attempting to sneak into an X-rated movie. Now this! In her own home and right on the computer she had thought was so important for his schoolwork. What in the world should she do? She considered buying some technology that screens and controls computer use, but wondered how far she should go in limiting or intruding into her son's cyberexperience.

Fortunately—and *unfortunately*—IT provides a new and ever-



growing panoply of sophisticated software "solutions" to such problems. They range from simply "spying" on the cookies that have been sent back from the websites your target has visited to built-in technologies that limit browsing capacity, and on to more complex technology like the Spector system, which automatically and surreptitiously makes time-sensitive samples of website activity for review at a later date.

I say *fortunately* when referring to such technologies because

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some of them will eventually provide opportunities for increased personal safety and a heightened sense of freedom. Yet I also say *unfortunately* because these “genies,” released from the bottles of IT creativity, can and have been used as spying devices within families. As a headline in *The Wall Street Journal* put it, “It’s Not Big Brother Invading Kids’ Privacy, It’s Mom and Dad.”

“Well, what’s a parent to do?” some might object. “We live in a world where kids can do terrible things with technology, from pornography to pipe bombs. Isn’t it our job to protect them?”

The answer to the question “Should parents maintain a responsible and involved role in their kids’ lives?” is, indeed, a def-

basketball to (dare I say it?) computer games—and engage in it with them in a space safe from observers, criticism or ridicule: a shame-free zone. Don’t ask too many questions at first—just play. Slowly broach the topic and then provide emotional space and time for response (no badgering). Eventually, whether on the first foray or several activities later, you’ll be surprised at how well your child opens up.

This is exactly what Rick’s mother chose to do. Without denying the seriousness of her son’s actions, she suggested they do something together he’d enjoy. He responded immediately, inviting her to play his new computer game. With Rick happily winning every round, his mom carefully broached the ques-

tion of those websites. A little uncomfortable at first, Rick explained that a lot of the kids at school were talking about sex and that he was interested but confused. He reminded his mother that when the topic had come up at dinner his father

had seemed embarrassed and she had suggested they talk about it later. But later had never come. So, in the absence of the parent-child connection, what better alternative than to explore on the Internet.

Rick’s mom then took a bold move and asked her son if they could view the sites together. “Sure, I guess so,” he responded hesitatingly. Seen from this new perspective, Rick’s mom lost her sense of exasperation and disgust and Rick became a little less guarded—if still a bit shy. Mom began to talk about girls’ bodies and their interest and concerns about sexuality. The two even had a lively discussion about the demeaning portrayal of females in the media. Rick was able to reconnect with parental wisdom, and the computer had returned to its rightful place as a tool for learning rather than a seducer of lost souls.

Imagine how different things would have been if Rick’s mom had lectured him or begun spying through technology. The moral, if there is one, may be that we must become neither mindless Luddites nor Big Brothers using IT to breach our trust with the next generation. Instead, we must rely on an open, honest relationship with our children. **CIO**

Do you think technology should be used to spy on kids? Let us know at difference@cio.com. Dr. William S. Pollack is on the faculty of the Harvard Medical School and director of the Center for Men and Young Men at McLean Hospital in Belmont, Mass. He is the author of numerous books about parents, children and gender issues, including *Real Boys* (Holt/Owl, 1999), *Real Boys Voices* (Penguin, 2001) and *Real Boys Workbook* (Random/Villard, 2001).

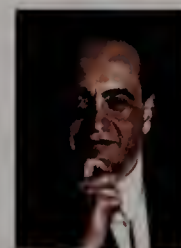


PHOTO BY JOYCE RAVID

Technology-enabled snooping actually prods our kids to engage in more of the very computer-based behavior we’re trying to avoid.

inite yes. My own research with boys who get in trouble or become depressed and suicidal corroborates the fact that parental involvement is essential for creating a generation of healthy children and teens. In fact, it is more powerful than peer pressure. But the key to such involvement is a genuine connection between parent and child. Ironically, technology-enabled snooping actually prods our kids to engage in more of the very computer-based behavior we’re trying to avoid.

In the WSJ article previously mentioned, teens made it clear that they had the computer sophistication to get around many of their parents’ technology roadblocks and considered it a challenge to do so. Worse, the parents using these technologies are betraying any sense of trust and diminishing the opportunity to build new relational connections with their offspring. Their behavior also sends the message that the solution to interpersonal problems lies in technology.

Power Down

So, what *is* a parent to do? I believe this is the time to turn off the technology and connect on a human level: to talk, understand and interact with our kids. Rather than up the ante in the technology battle, this is an opportunity to try to genuinely understand what issues may be leading to these upsetting behaviors in your child. And that can be achieved only by having a heart-to-heart talk that is nonjudgmental, mutual (not a lecture!) and open-ended.

A method I developed primarily for working with taciturn teen boys, but that works for all kids, is called action talk. Put simply, it means not forcing kids to open up before they are ready. Rather, choose an activity they enjoy—from chess to



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Opinion | Re:

Public Sector IT Outsourcing
Secrets of Installation Success

Private Lessons for the Public Sector

BY RUFFIN VEAL III

PRIVATIZATION HAS FORCED those of us in the public sector to reevaluate, redefine and in some cases, reorganize IT departments. Traditionally, public sector IT organizations have enjoyed the luxury of a captive customer base for their services. State and local government organizations have provided services to their constituents, and in turn, IT departments have provided the necessary data processing services to their government organizations. Yet this situation is quickly changing.

Privatization is simply the hiring of private sector vendors to provide IT services traditionally offered by in-house public sector IT departments. The concept of privatization has spawned the growth of outsourcing.

Outsourcing IT services is not a new concept. It goes back to 1989, when Eastman Kodak and Enron signed multi-million-dollar contracts with outside vendors to provide their nonstrategic IT services. More recently, state and local governments nationwide have been closely watching the highly publicized outsourcing initiatives by San Diego County and Fairfax County, Va. These two counties have embarked on multimillion-dollar, long-term strategic plans



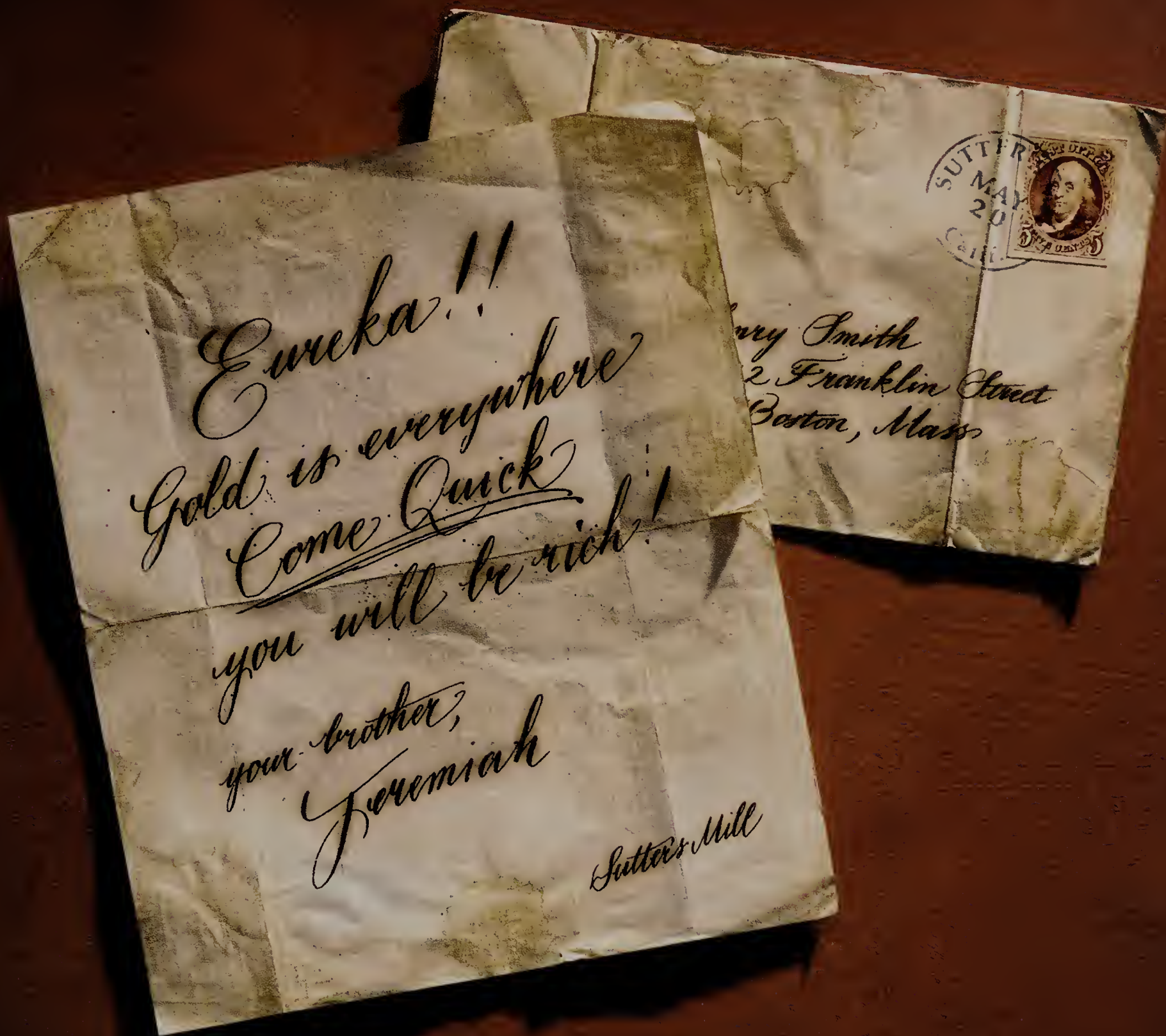
to privatize and outsource most if not all of their IT functions.

Outsourcing has further evolved into an entirely new industry of ASPs that provide outsourced services for specific applications via the Internet. As the attractiveness of privatization gains momentum, those of us in the public sector need to understand how it will affect our organizations.

The appeal of outsourcing IT services in the public sector boils down to three factors: the cost of implementing technology, the cost of upgrading technology and the cost of maintaining staff. Shrinking budgets and constituents' demanding the most from every tax dollar are forcing elected officials to seek alternative methods of providing necessary support services. As new technologies emerge, traditional public sector IT departments are hard-pressed to provide the services these technologies afford.

Traditional state and local IT organizations are set up as departments with corresponding levels of management and

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coordination capabilities. Outsourcing, however, requires high-level IT management and coordination. This management group is responsible for setting a company's IT direction and reporting to the CEO the needs and expectations of various departments. This type of structure prohibits the purchase and disbursement of rogue applications and systems without regard to a company's overall direction or strategy. It also facilitates better usage and coordination of financial and IT resources.

Public sector IT management must begin to think of themselves and their departments as the consultancy of choice for

approval rights are important elements of an outsourcing contract that IT administrators must enforce for successful post-contract management.

If we are—as we should be—in the middle of negotiations between user departments and outside vendors, the user will hold us responsible for the success or failure of the contract. Therefore, we must have a governing body that meets regularly to monitor and report on vendor compliance. The contract should be structured to levy fines for vendor noncompliance, which is more likely to get the attention of upper-level vendor management and is less time-consuming than getting contract concessions for noncompliance issues. If vendor service or compliance is unsatisfactory, we must have an established avenue of complaint resolution that directly involves upper-level vendor management.

Finally, the contract should have a clause ensuring that the personnel initially assigned will remain on the project for its duration or for a mutually agreed on length of time. That prevents vendors from bringing in their best people at the beginning of a project and then slowly removing this expertise once the project is under way.

As public demands for more services with fewer tax dollars increase, public sector service providers need to continually explore new ways to meet the challenge. Because the cost-cutting benefits will continue to be attractive, outsourcing is here to stay. **CIO**

Ruffin Veal III is the IS associate manager for Ramsey County in St. Paul, Minn.

As new technologies emerge, traditional public sector IT departments are hard-pressed to provide the services these technologies afford.

their government entity. They must strive to establish themselves as the place to go when department heads are considering IT services, even if they are incapable of providing those services. When dealing with outside vendors, they want to be sitting on the purchasing department's side of the negotiating table. As IT professionals, not only do we need to be present in these situations, we must also be prepared.

An outsourcing deal requires a contract with the vendor, and there are several things to keep in mind throughout the life of these contracts. For starters, managing the relationship of the contract is essential. Service-level agreements, compliance responsibilities, performance reporting, and vendor and client

Don't Install—Implement

BY JAMES VICK

AFTER SEVERAL EXPERIENCES with ERP during the past 20 years, I have found two typical outcomes. An ERP installation merely puts the software on the hardware. But an implementation results in a new system that drives profits by improving productivity and organizational effectiveness.

Given this distinction, most CIOs would prefer to oversee a

successful ERP implementation instead of a successful ERP installation. The characteristics of wasteful installations are many.

Strong Project Managers

Weak project leadership is always going to result in a mere installation. All too often, a project manager is selected on the basis of expendability from whatever that person was doing before. You know a strong project manager when you see one. A good project manager understands the difference between why the software is being installed and why the system is being implemented. The project manager can deal with all levels of the organization and possesses tremendous political skills, but can be ruthless when required.

The well-suited project manager has a broad background with a focus on operations. The more diverse the background, the greater the ability to consider optimal solutions to the

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hundreds of constraints and conflicts that are germane to ERP projects. If the project manager's background is narrow, these issues could slip through the cracks, only to appear after the software is installed.

Steering Committee Leadership

If the steering committee members lean back in their chairs during the monthly review meetings and yawn a great deal, you would be better off canceling the project and continuing with whatever legacy system is in place. All too often, the steering committee consists of executives who have excelled at their discipline but are not integrated managers.

Whenever an individual team member's attendance falls below 80 percent, go to the steering committee and request a replacement.

An integrated manager knows both the numbers and values that the organization provides to the marketplace. For example, the controller knows the numbers but may be clueless about the values if he never sold the product to the customer. The marketing vice president knows the values but does not know the numbers unless she worked in the accounting department.

So the steering committee should be composed of thinkers from several departments who can combine their backgrounds and provide a level of integration that's required for a successful implementation.

It is important for the project manager to understand the steering committee and force it to make timely decisions. Steering committees tend to have a member who is either integrating efforts across departments or is attempting to do so. This person is the informal leader and de facto decision maker regardless of his position in the organization. Often, the president or the highest-ranking person on the corporate pecking order has final authority over all decisions. Without a single decision maker, meetings often conclude with a call for more analysis. This is not something that lends itself to successful software implementations.

Keeping Tabs and Educating Users

Always maintain an attendance log for team meetings, project meetings and steering committee meetings. Whenever an individual team member's attendance falls below 80 percent, go to the steering committee and request a replacement. Few organizations maintain this discipline or philosophy, but it's

necessary for a successful implementation. You are looking for people who can make things happen.

Don't underestimate the importance of education and training. What's the difference between the two? Training provides specific knowledge about the software and hardware, and focuses more on the "how to" aspect of the project. Education is an expansion of the software's and hardware's mechanics and philosophy, and its focus is more on why an organization is undertaking the project.

In 1996, a client asked me to implement an ERP system. I wanted to budget time and money for a one-day educational class. Since the client had already had three major systems projects in the past 25 years, the steering committee deemed education unnecessary. I then asked committee members to solve a simple gross-to-net calculation I wrote on a blackboard. When only one member came up with the correct answer, the steering committee immediately approved the class.

To determine the level of education required, create a test for members of the steering committee and project team. Ask them 10 questions or so; if the average score is less than 75, it's time to establish an education budget.

Objectives, Objectives, Objectives

Never lose sight of why you are implementing a new system: to increase profits. Always plan a post-implementation audit to verify that the objectives are achieved. Remind everyone that this audit will reveal how well the job was done.

A high-level project plan should be the same at the end of the project as it was at the beginning. This is the primary communications device with the steering committee—the project manager will have a copy of this on his pillow. However, as the project matures, action items in the plan begin to grow exponentially, and as many as half of all assigned tasks are slated for completion in the last 10 percent to 15 percent of the time allotted for the project.

These are the major characteristics that lead to a successful ERP implementation. Follow them, and you and your organization are well on the way to triumph. **CIO**

Do you have an opinion you would like to express? Let Senior Editor Megan Santosus know at santosus@cio.com.

James Vick, who formerly worked for a company specializing in lean manufacturing and ERP implementations, is general manager of Engine Masters, a Delco Remy International company in Dallas.



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The Fog of Yore



Gary J. Beach

A FOG IS SPREADING all over the country. It is not your typical meteorological fog, however. This one is not contained to one geographic region, and no sunny forecast nor predictions of gusty winds appear to be changing the gloomy outlook anytime soon.

American business leaders and Wall Street gurus, who just a year ago unabashedly heralded the benefits of improved productivity made possible by IT, seem to be managing their companies and their portfolios in a fiscal fog.

Granted, IT budgets have become a major investment line, and top management hit IT leaders' budgets hard in the first quarter. But stock market sell-offs, particularly among the tech-laden Nasdaq, seem predicated on the fact that CIOs' budgets have been cut forever.

They are not.

Here's the proof. According to *CIO*'s research, 18,072 *CIO* subscribers in February 2000 claimed that 25 percent or *more* of their company's annual revenues were attributed to

e-commerce transactions. In a follow-up survey completed in April 2001, that number rose to 30,038—an astonishing 67.9 percent increase.

Earth to Wall Street gurus: The IT budgets and e-business priorities of CIOs are alive and well. Stop acting and trading like IT initiatives have been sent to the digital dustbin of never-to-be-implemented corporate initiatives.

It's only a matter of time before CIOs and their IT departments get the funding green light. The trick right now for CIOs, however, is to build sales and market share for their organizations before that new funding era. And not play spending catch-up later on.

I'm no meteorologist, but fog sometimes lifts when a strong wind blows in. My forecast calls for the winds of reason to start blowing. And soon. I believe the fog will lift and smart CIOs will again invest aggressively in technology tools to help their businesses create models that solve real customer problems.

What do you think? Is the fog lifting at your company and in your industry? Drop me a note.



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CIO @ perspectives

Different Voices Shared Visions Get It Right: The New Alignment



THE INTERNET and related technologies have spawned entirely new business methods and models; virtually every organization has new e-business units headed by managers with titles unknown just a few years ago. CEOs, CFOs and other CXOs have more to say about the technology decision-making process, while CIOs are expected to contribute more to the business strategy. The definitions of customer and partner have changed — and their expectations of your company have changed as well.

Today's economy is putting even greater pressures on IT and business to be in closer alignment. Companies are placing a heavier burden on IT to help launch initiatives that focus on the customer, take advantage of new opportunities, bolster the bottom line, and improve cost efficiencies in existing operations.

These efforts require solid strategies, clear prioritization, the understanding and buy-in from traditional and e-business units, and the right infrastructure and resources in place to support it all. Turf wars and finger-pointing definitely won't cut it; success will only come when different voices embrace shared visions. Executives in both business and IT camps need to create an environment, and fashion a partnership and process to make this happen.

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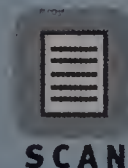
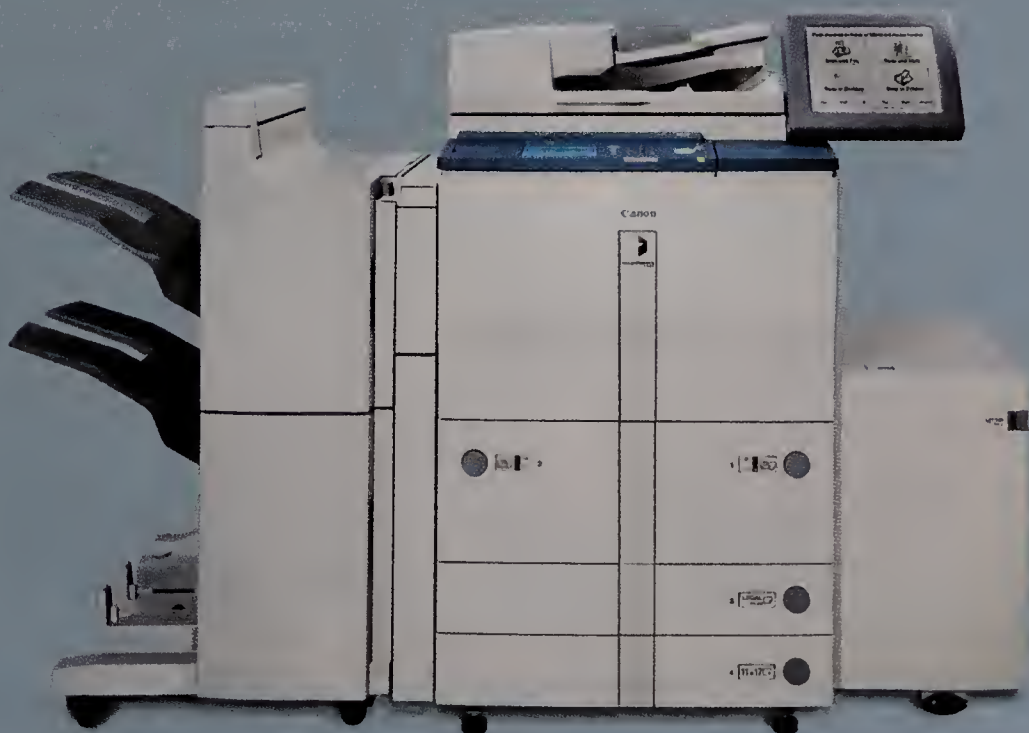
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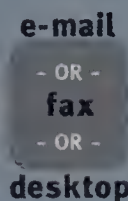
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DO NOT FOLD, SPINDLE OR MUTILATE.

This stern warning, found on the punch cards ubiquitous in the mid-20th century, is etched in the memories of a generation. Recite it to any IT pro over a certain age and you'll elicit stories of summers spent collating wayward cards or recent trips to the Smithsonian to see a card sorter categorized as a museum relic.

F. Warren McFarlan, now a professor at Harvard Business School, remembers the nerve-jangling process of completing his doctorate in MIS in 1965. The 10,000-line Fortran program he had created was stored on thousands of punch cards. "All you needed was one card upside down, or you dropped one on the floor or a card jammed in the machine, and life became very exciting and complicated," he says.

Punch cards allowed information to be taken off a sheet of paper and manipulated physically and electronically. Developed by American inventor Herman Hollerith, who was looking for a way to speed up the job of the U.S. Census Bureau in 1890, the cards were inspired in part by those used to control patterns on the Jacquard textile loom. Hollerith's cards contained data arranged by combinations of perforations; each card could store as many as 80 variables. The punched cards were then fed into a tabulating machine. The com-

pany Hollerith later founded to make these machines eventually became IBM.

The punch card retreated into the background decades ago, but occasionally evidence appears that proves it is not yet extinct (two words: hanging chads). Says McFarlan, "Deep in the inner nooks of public service and backward organizations, traces of this technology live on today." **CIO**

Feeling nostalgic about a favorite technology? Tell Features Editor Sara Shay at sshay@cio.com.



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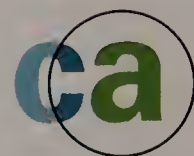
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